XTRD-400K
Operation and Installation Manual

Document Number: MN5-0062-301
Revision: A
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3550 Bassett Street
Santa Clara, CA 95054 USA
408-213-3000 Phone • 408-213-3001 Fax
www.xicomtech.com

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NOTICE

The information in this document is subject to change without notice. Please contact Xicom Technology for current technical specifications.

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About this manual

This manual provides operators and technicians with a set of tools for operating and maintaining the Rack Mount Family of Xicom Power Amplifiers.

This Prefix contains a Table of Contents that applies to the entire manual and a Record of Changes page that applies only to this Prefix.

Each Chapter and Appendix has its own Part Number, Revision Level, Record of Changes page, Table of Contents, List of Figures, and List of Tables.

Chapter One—Provides an overview of the manual; delineates who should use the manual; how to contact Xicom Technology.

Chapter Two—Describes safety information that pertains to Xicom Technology products. It also provides information about Warnings, Cautions and Notes that are found throughout the manual.

Chapter Three—Provides general installation information, communication interface switch settings and cable pinouts.

Chapter Four—Provides the operating instructions for the power amplifier.

Chapter Five—Provides communication protocols used with Xicom Technology power amplifiers.

Chapter Six—Describes the preventive maintenance requirements for Xicom Technology power amplifiers

Chapter Seven—Provides information regarding service and repair of Xicom Technology power amplifiers, including instructions on obtaining RMA (Return Maintenance Authorization) Numbers.

List of Abbreviations, Acronyms, and CE Symbols—Lists the abbreviations, acronyms, and CE symbols that may be found in Xicom Technology documentation.

Appendices—The Appendices provide operators and technicians with information and specifications that are specific to their particular version of Xicom Technology Power Amplifier.

Who should use this manual

This manual is designed for use by trained operators and technicians who have a thorough knowledge of satellite transmitting and receiving equipment.

Persons using this manual should familiarize themselves with the information in the Appendices before reading the main sections.

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	06/23/2003	ALCjr
A	15255	Correct HPA designation on Spline	01/30/2007	LD

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List of Abbreviations, Acronyms, and CE Symbols

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
A	9735	Original Release	04/17/2002	A.L. Crozier, Jr.
A1	10179	Add numerous abbreviations	08/21/2002	A.L. Crozier, Jr.
A2	10646	Add more abbreviations; CE symbols	01/14/2003	A.L. Crozier, Jr.
A3	11044	Add more abbreviations	05/15/2003‘	A.L. Crozier, Jr.
A4	11802	Add more abbreviations	01/13/2004	A.L. Crozier, Jr.
A5	12050	Add more abbreviations	03/19/2004	A.L. Crozier, Jr.
A6	12808	Add more abbreviations	02/23/2005	A.L. Crozier, Jr.
A7	14758	Correct entries and add new entries	09/08/2006	ALCJr

List of Abbreviations, Acronyms, and CE Symbols

References

The following documents are used as reference material for this chapter:

- International Standard ISO-7000: 1989. *Graphical symbols for use on equipment — Index and synopsis*
- International Standard CEI/IEC 60417-2: 1998. *Graphical symbols for use on equipment — Part 2: Symbol originals*
- Society of Exploration Geophysicist. 1980. *The SI Metric System of Units And SEG Tentative Standard*.
- The American Society of Mechanical Engineers. November 1999. *ASME Y14.38-1999. Abbreviations and Acronyms*.
- Wachal, Robert S. 1999. *Abbreviations Dictionary: A practical compilation of today's acronyms and abbreviations*. Boston/New York: Hougton Mifflin Company.
- Franklin Covey. 1999. *Franklin Covey Style Guide: FOR BUSINESS AND TECHNICAL COMMUNICATION, THIRD EDITION.*

Abbreviations and Acronyms

Abbreviation or Acronym	Definition
AC	alternating current
ack	Acknowledgement
ad	analog-to-digital
ADC	analog-to-digital converter
AFC	automatic frequency control
AGC	automatic gain control
ALC	automatic level control
amp (A)	ampere
amphr	ampere-hour
ampl	amplifier
anlg	analog
ant	antenna
ATP	Acceptance Test Procedure
AVC	automatic volume control
BA	buffer amplifier

Abbreviation or Acronym	Definition
BDELIM	band elimination
BIT	binary digit
bmw	beamwidth
btry	battery
BUC	Block Upconverter
buz	buzzer
bw	bandwidth
°C	degree Celsius
cal	calibration
CATE	computer aided test equipment
CB	component board
CCTWT	Coupled Cavity Traveling Wave Tube
commsat	communications satellite
CPU	central processing unit
CRC	Cyclic Redundancy Check
CTRF	center frequency
CTS	Clear to Send
CW	continuous wave
DA	digital-to-analog
DAC	digital-to-analog converter
dB	Decibel
dBc	Decibels referenced to carrier
dBI	Decibels referenced to Amperes or Decibels referenced to Isotropic Gain
dBm	decibels referenced to one milliwatt
dBW	decibels referenced to Watts
DC	direct current
DCD	Date Carrier Detect
deg	degree
dgtl	digital
distn	distortion
DSR	Data Send Ready
DTR	Data Terminal Ready
Ef	filament voltage
EIK	Extended Interaction Klystron
Ek	cathode voltage
EMI	electromagnetic interference
ETX	End of Transmission

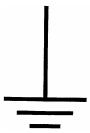
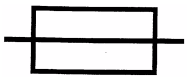
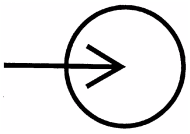
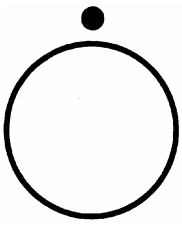
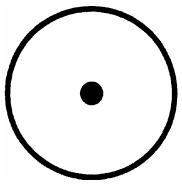
Abbreviation or Acronym	Definition
Ew	helix voltage
°F	degree Fahrenheit
F	farad
FAT	First Article Test
FET	field-effect transistor
FGIPA	Fixed Gain Intermediate Power Amplifier
freq	frequency
FTD	Filament Time Delay (TWTA, KPA)
G	Giga (one billion)
GHz	Giga Hertz
H	henry
Hi-pot	Process using a high voltage power supply to verify high voltage insulation leakage.
HPA	High Power Amplifier
HV	High Voltage
Hz	Hertz
IC	integrated circuit
IESS	Intelsat Earth Station Standards
IF	Intermediate Frequency
I/P	Input
inv	inverter
IPA	Intermediate Power Amplifier
IrDA	Infrared Data Association
Iw	helix current
k	kilo (one thousand)
K	cathode
kg	kilogram
kHz	kilo Hertz
KMT	Klystron Microwave Tube
KPA	Klystron Power Amplifier
kV	kilo Volt
kVAH	kilovolt-ampere hour
kVAHM	kilovolt-ampere hour meter
kVAM	kilovolt-ampere meter
kW	kilo Watt
kWHM	kilowatt-hour meter
LC	inductance-capacitance
LCD	liquid crystal display

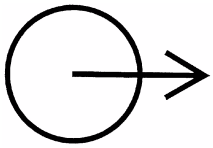
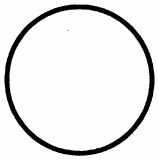
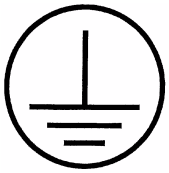
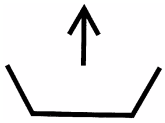
Abbreviation or Acronym	Definition
LDA	Line Driver Amplifier
LED	Light Emitting Diode
LO	Local Oscillator
LPA	Low Power Amplifier
M	Mega (million)
M&C	Monitor and Control
mA	milli Ampere
MSDC	Multistage Depressed Collector
MHz	Mega Hertz
miprcs	microprocessor
MPS	Modular Power Supply
MSDC	Multi-Stage Depressed Collector
MSL	mean sea level
MTBF	mean time between failures
MTTR	mean time to repair
mV	milli Volt
MW	Mega Watt
mW	milli Watt
NAK	negative acknowledgement
oc	overcurrent
ODU	Outdoor Unit
OEM	other equipment manufacturer
O/P	Output
ovv	over voltage
PBIT	parity bit
PCB	printed circuit board
PF	power factor
PFC	power factor correction
PS	power supply
PSU	power supply unit
PWM	pulse-width modulation
pwr	Power
RF	Radio Frequency
RFU	RF Unit
RMA	Returned Material Authorization
RMS	root mean square (.707)
RTS	Ready to Send

Abbreviation or Acronym	Definition
RU	In a standard 19-inch rack, a set of four mounting holes spaced as follows: .625 inches between holes 1, 2, and 3. .5 inches between holes three and four. RU = 1.75 inches.
RXD	Received Data
SLIN	Linearizer with an integrated variable gain SSA
SSA	Solid State Amplifier
SSPA	Solid State Power Amplifier
STDBY	Standby
STX	Start of Transmission
TD	Time Delay (SSPA)
TEC	Thermal Electric Cooling. This is a technique used to regulate the operating temperature environment of a device.
TPS	Test Performance Sheet
TWT	Traveling Wave Tube
TWTA	Traveling Wave Tube Amplifier
TXD	Transmitted Data
UMBC	umbilical cord
undc	undercurrent
UPS	uninterrupible power supply
VAC	Volts alternating current
VDC	Volts direct current
VGA	variable gain amplifier
VGIPA	Variable Gain Intermediate Power Amplifier
VPC	Variable Phase Combiner
VSWR	voltage standing wave ratio
W	Watt
wg	waveguide
Wh	watthour
WHM	watthour meter
wm	watt meter
wtrg	with respect to ground
wtrc	with respect to cathode
wtrprf	waterproof
wtrtt	watertight
WV	working voltage
XFMR	Transformer

Abbreviation or Acronym	Definition
XMIT	Transmit
XT	Xicom Technology Analog Outdoor Amplifier
XTC	Xicom Technology Controller
XTD	Xicom Technology Digital Outdoor Amplifier
XTK	Xicom Technology Klystron Amplifier
XTKD	Xicom Technology Klystron Amplifier with Flat Display
XTKH	Xicom Technology Klystron High Efficiency Amplifier — Flat Display with Multistage Depressed Collector
XTPS	Xicom Technology Power Supply
XTRD	Xicom Technology Rack Mount Digital Amplifier
XTRD-LDA	Xicom Technology Rack Mount Line Driver Amplifier
XTRS	Xicom Technology Solid State Rack Mount Amplifier
XTS	Xicom Technology Solid State Outdoor Amplifier
XTU	Xicom Technology Outdoor Amplifier with Block Upconverter

CE Symbols

Symbol	Definition
	Alternating Current (AC)
	CE Marking symbol for equipment and documentation meeting European Quality Standards.
	Earth Ground
	Fuse
	Input
	Local
	OFF for a part of equipment
	ON for a part of equipment

Symbol	Definition
	Output
	Power OFF
	Power ON
	Protective Earth Ground
	Remote
	Reset
	Transmitted Power Monitor

Overview

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Format changes	08/2001	A.L. Crozier, Jr.
3		Format change—Table of Contents, List of Figures, List of Tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/12/2001	A.L. Crozier, Jr.
B	10359	Update Contacting Xicom Technology paragraph	10/14/2002	A.L. Crozier, Jr.

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Overview

Product Overview

The Xicom Technology Rack Mount Power Amplifier is programmable and microprocessor controlled. The amplifier consists of:

- a TWT (Traveling Wave Tube).
- a SSA (Solid State Amplifier)
- a power monitor
- a TWT Power Supply
- a Linearizer (Optional)
- a programmable M&C (Monitor & Control) system
- dual remote control interfaces (COM1 and COM2).
- an internal forced air cooling system.

The COM1 interface is RS-232 only; the COM2 interface may be configured for RS-422 or RS-485 operation. There are hardwired summary fault and external interlock circuits available for user defined functions.

Refer to Figure 1, “Typical Rack Mount Amplifier Block Diagram“ for a typical block diagram of the Power Amplifier.

Refer to the appendix titled *Specifications* for the details of your amplifier.

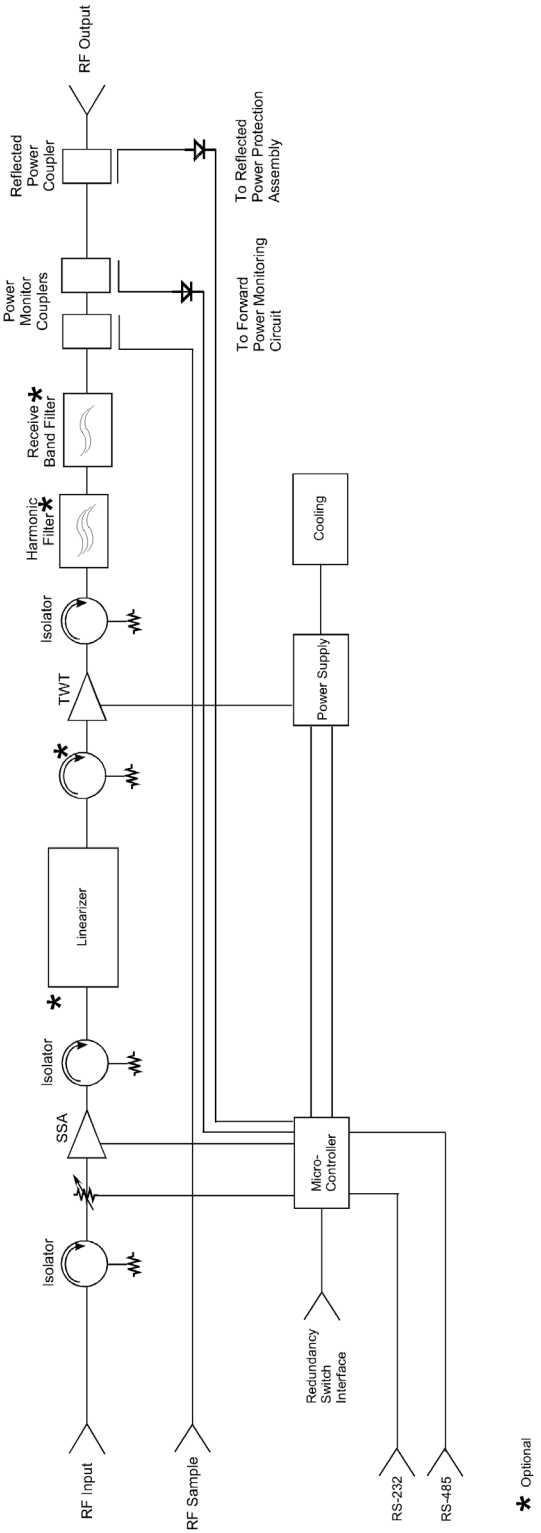

Figure 1, Typical Rack Mount Amplifier Block Diagram

Control and Status Interface

The amplifier is controlled in Local Mode from the front panel or Remote Mode from an external controller (M&C system). Local control of the amplifier is described in the chapter titled *Unpacking and Installation*. Refer to the chapter titled *Operation* and the chapter titled *Amplifier Communication and Protocol* to operate the power amplifier in the Remote Mode.

Physical Characteristics

Refer to the appendix titled *Specifications* for the Physical Characteristic Specifications of your amplifier.

Environmental Characteristics

Table 1, Environmental Specifications, lists the typical rack mount amplifier environmental specifications.

Refer to the appendix titled *Specifications* for the environmental specifications unique to your amplifier.

Table 1, Environmental Specifications

Parameter	Specification
NON-OPERATING TEMPERATURE RANGE	-50°C to +70°C
OPERATING TEMPERATURE RANGE	-10°C to +50°C
ALTITUDE	10,000 feet MSL maximum
SHOCK AND VIBRATION	Normal transportation
COOLING	Forced air

Specifications

Refer to the appendix titled *Specifications* for the specific specifications of your amplifier.

Contacting Xicom Technology

Assistance

If you need to contact Xicom Technology for assistance with your product you may use one of the following:

Address:

Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054 USA

Telephone: 408-213-3000
Facsimile: 408-213-3001

www.xicomtech.com

Technical Support —
email: support@xicomtech.com
Telephone: 408-213-3109 (24 Hours)
Facsimile: 408-213-3107

Sales: sales@xicomtech.com

Feedback

Xicom technology wants to receive customer feedback concerning the format, content and accuracy of the documentation that is shipped with the products. We also want customers to submit comments and suggestions or request assistance in solving problems with any of our products.

Please access our web site at http://www.xicomtech.com and click on Customer Feedback Forms to go to the Customer Feedback Page. You may download the appropriate form and submit your requests and comments using the forms on this page.

Safety/Sicherheit

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Format changes	08/2001	A.L. Crozier, Jr.
3		Format change—Table of Contents, List of Figures, List of tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/12/2001	A.L. Crozier, Jr.
B	9288	Update to include 2kW Amplifiers	11/20/2001	A.L. Crozier, Jr.
C	9433	Change “dispatching” to “dissipating” on page 7.	01/24/2002	A.L. Crozier, Jr.
D	9535	Add General Warning on page 4.	02/22/2002	A.L. Crozier, Jr.
E	12926	Add German Translation for CE compliance	03/22/2005	A.L. Crozier, Jr.

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Safety/Sicherheit

General Information

This chapter identifies the safety requirements to be applied when performing any of the procedures specified in this manual. It is the responsibility of the user to follow all applicable safety regulations when using this manual. This chapter contains safety summaries consisting of general safety and health precautions.

Summaries

Description

Equipment of this nature has inherent hazards. Only trained Operators and Service Personnel should work on or operate this equipment.
The general safety requirements identified in this chapter are applicable to anyone doing the procedures included in this manual.

Warnings, Cautions, and Notes

Warnings, cautions, and notes are used in these procedures to alert the user to special conditions regarding safety or correct performance of a particular step or steps. They are placed immediately prior to the procedural step to which they apply, or immediately prior to the procedure itself if they apply to the entire procedure.
Warnings and cautions are constructed in three parts or sentences. First, the hazard is stated; second, the correct action to be performed is stated; and, third, the result of failing to comply with the action is stated. Notes, however, can be in any form necessary to convey the needed information. The definitions below show how warnings, cautions, and notes are used.

WARNING — A procedure, technique, restriction, etc., if not followed exactly, ***could result in injury or death*** to personnel.

WARNING

This symbol denotes an ELECTRICAL SHOCK HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from electrical shock.

WARNING

This symbol denotes a RADIO FREQUENCY BURN HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from radio frequency burns.

WARNING

This symbol denotes a LADDER FALL HAZARD WARNING in a procedure step and is used whenever death or injury to personnel could result from improper use of a ladder.

WARNING

This symbol denotes a GENERAL HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from improper performance of the procedural step.

Caution — A procedure, technique, restriction, etc., if not followed exactly, ***could result in damage*** to equipment.

Caution

This symbol denotes a CAUTION in a procedural step. A CAUTION is used whenever equipment damage could result if the procedure is not correctly followed.

Note — A procedure, technique, restriction, special interest, etc., that requires emphasis or consideration for the performance of a procedural step or steps.

Note

This symbol denotes a NOTE in a procedural step. A NOTE is used whenever emphasis or consideration for the performance of a procedural step or steps is necessary.

General Warnings and Cautions

High Voltage Hazards

WARNING

The ODU (Outdoor Unit) power amplifier is not equipped with internal safety interlock switches. Turn OFF primary power before removing amplifier enclosure cover. Failure to comply could result in serious injury or death.

WARNING

The power amplifier uses high voltage that may be lethal if contacted. When the amplifier's power supply cover is removed multiple high voltage points are exposed. Use extreme care when operating the amplifier with the cover removed. Failure to comply could result in serious injury or death.

WARNING

To prevent electrical shock the amplifier should not be operated with the cover removed unless service personnel are thoroughly familiar with its operation and are experienced with high voltage. Failure to comply could result in serious injury or death.

WARNING

To prevent electrical shock use a shorting probe rated at 20 kV isolation at the handle to discharge capacitors. Failure to comply could result in serious injury or death.

WARNING

To prevent electrical shock when servicing a Klystron Tube or a 2 kW Power Amplifier:

- ensure the Bus Indicator LED located in the Power Supply Drawer High Voltage side is out.
- use shorting probe before taking measurements on the capacitor bank.

Failure to comply could result in serious injury or death.

WARNING

When required to measure voltages in a High Voltage Power Supply:

- turn the equipment OFF.
- use shorting probe to ensure capacitors are discharged.
- ensure meter probes are properly insulated and capable of handling votlages of 20 kV or more.
- attach probes using one hand.
- ensure probes are not touching other contacts.

Failure to comply could result in serious injury or death.

Ladder Hazards

WARNING

When required to use a ladder ensure that:

- the ground in the area where the ladder will be used is free of objects that could cause the ladder to be unstable.
- You have read and understand ALL the labels that are affixed to the ladder.
- you are wearing all appropriate safety equipment such as hard hat, safety harness, etc.

Failure to comply could result in serious injury or death.

RF Radiation Hazards

WARNING

The power amplifier is capable of generating high power microwave radiation that can cause bodily harm. Prior to operation ensure that:

- the technician assigned to perform the maintenance does not wear a pacemaker.
- all the microwave connections are securely fastened.
- that there is no microwave leakage.

Failure to comply could result in serious injury or death.

Caution

Never operate the amplifier with an open waveguide. The waveguides and Microwave Tube should always be terminated into a load capable of dissipating full RF power. Failure to comply could result in equipment damage.

Magnetic Field

Caution

A Microwave Tube has a very strong magnetic field. The tube can be damaged if it comes in contact with magnetic objects or tools.

DO NOT:

- place the amplifier on a magnetic storage rack.
- use magnetic tools for installation, maintenance, or repair.

Failure to comply could result in equipment damage.

Sicherheit

Allgemeine Information

Dieses Kapitel benennt die Sicherheitsvorkehrungen, die bei der Durchführung eines jeden in diesem Handbuch angeführten Verfahrens getroffen werden müssen. Der Benutzer ist bei der Verwendung dieses Handbuches verpflichtet, alle zutreffenden Sicherheitsvorschriften zu befolgen. Dieses Kapitel fasst allgemeine Sicherheitsbestimmungen und Gesundheitsschutz zusammen.

Zusammenfassungen

Beschreibung

Geräte dieser Art bergen inhärente Gefahren. Nur ausgebildetes Bedienungs- und Wartungspersonal sollte an ihnen arbeiten oder sie betreiben.
Die in diesem Kapitel ausgeführten allgemeinen Sicherheitsanforderungen betreffen jeden, der die in diesem Handbuch enthaltenen Verfahren durchführt.

Warnungen, Vorsichtshinweise und Hinweise

Warnungen, Vorsichtshinweise und Hinweise werden in diesen Verfahren verwendet, um den Benutzer auf besondere Bedingungen bezüglich Sicherheit oder korrekte Durchführung eines einzelnen Schrittes oder mehrerer Schritte aufmerksam zu machen. Sie befinden sich unmittelbar vor dem Verfahrensschritt, auf den sie sich beziehen, oder unmittelbar vor dem Verfahren selbst, falls sie sich auf das gesamte Verfahren beziehen.
Warnungen und Vorsichtshinweise gliedern sich in drei Teile oder Sätze. Erstens wird die Gefahr benannt, zweitens wird die korrekte zu ergreifende Maßnahme benannt, und drittens werden die Folgen der Nichtergreifung der Maßnahme benannt. Hinweise hingegen können auf jede Art gegeben werden, die der Übermittlung der nötigen Information dienlich ist. Die untenstehenden Symbole verdeutlichen, wie Warnungen, Vorsichtshinweise und Hinweise vermittelt werden.

WARNUNG —Wenn ein Verfahren, eine Technik, Einschränkung usw. nicht genau befolgt werden, ***könnte dies zur Verletzung oder zum Tode*** von Mitarbeitern führen.

WARNUNG

Dieses Symbol bedeutet eine WARNUNG VOR DER GEFAHR EINES ELEKTRISCHEN SCHLAGES bei einem Verfahrensschritt und wird stets verwendet, wenn Mitarbeiter durch einen elektrischen Schlag getötet oder verletzt werden könnten.

WARNUNG

Dieses Symbol stellt eine WARNUNG VOR DER GEFAHR DER VERBRENNUNG DURCH HOCHFREQUENZ bei einem Verfahrensschritt dar und wird stets verwendet, wenn Mitarbeiter durch Hochfrequenz-Verbrennungen getötet oder verletzt werden könnten.

WARNUNG

Dieses Symbol bedeutet eine WARNUNG VOR DER GEFAHR EINES LEITERSTURZES bei einem Verfahrensschritt und wird stets verwendet, wenn Mitarbeiter durch unsachgemäßes Hantieren mit einer Leiter getötet oder verletzt werden könnten.

WARNUNG

Dieses Symbol bedeutet eine WARNUNG VOR EINER ALLGEMEINEN GEFAHR bei einem Verfahrensschritt und wird stets verwendet, wenn Mitarbeiter durch unsachgemäßes Handeln bei diesem Verfahrensschritt getötet oder verletzt werden könnten.

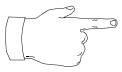
Vorsicht — Wenn ein Verfahren, eine Technik, Einschränkung usw. nicht genau befolgt werden, **könnte Beschädigung des Gerätes die Folge sein**.

Vorsicht

Dieses Symbol ermahnt zur VORSICHT bei einem Verfahrensschritt. Eine Ermahnung zur VORSICHT erfolgt stets, wenn die ungenaue Befolgung des Verfahrens zur Beschädigung des Gerätes führen könnte.

Hinweis—Ein Verfahren, eine Technik, Einschränkung, Besonderheit usw., die bei der Durchführung eines Verfahrensschrittes oder mehrerer Schritte Nachdruck oder Berücksichtigung erfordern.

Hinweis



Dieses Symbol bedeutet einen HINWEIS bei einem Verfahrensschritt. Ein HINWEIS wird stets verwendet, wenn bei der Durchführung eines Verfahrensschrittes oder mehrerer Verfahrensschritte Nachdruck oder Berücksichtigung erforderlich sind.

Allgemeine Warnungen und Vorsichtshinweise

Hochspannungsgefahren

WARNUNG

Der Leistungsverstärker des ODU (Outdoor Unit/Gerät für den Außenbereich) ist nicht mit internen Sicherheits-Verriegelungsschaltern ausgerüstet. Schalten Sie die Stromversorgung AUS, bevor Sie die Abdeckung des Verstärkerbereiches entfernen. Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNUNG

Der Leistungsverstärker steht unter Hochspannung, die bei Berühren tödlich sein kann. Wenn die Abdeckung der Stromversorgung des Verstärkers entfernt wird, liegen mehrere Hochspannungskontakte blank. Seien Sie äußerst vorsichtig, wenn Sie ohne Abdeckung am Verstärker hantieren. Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNUNG

Zur Vermeidung elektrischer Schläge sollte am Verstärker nur dann bei entfernter Abdeckung hantiert werden, wenn das Wartungspersonal mit seinem Betrieb völlig vertraut und im Umgang mit Hochspannung erfahren ist. Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNUNG

Verwenden Sie zur Vermeidung elektrischer Schläge bei der Entladung von Kondensatoren eine Kurzschluss-Sonde mit einer für 20 kV ausgelegten Griffisolierung. Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNUNG

Zur Vermeidung eines elektrischen Schlages bei der Wartung einer Klystron Röhre oder eines 2 kW Leistungsverstärkers:

- stellen Sie sicher, dass die auf der Hochspannungsseite der Stromversorgung befindliche Bus-LED-Anzeige erloschen ist.
- benutzen Sie eine Kurzschluss-Sonde, bevor Sie Messungen an der Kondensatorbatterie vornehmen.

Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNUNG

Wenn Sie Spannungen in einer Hochspannungsstromversorgung messen müssen:

- schalten Sie das Gerät AUS.
- benutzen Sie eine Kurzschluss-Sonde zur Sicherstellung, dass die Kondensatoren entladen sind.
- stellen Sie sicher, dass Mess-Sonden ordentlich isoliert und für Spannungen von 20 kV oder mehr ausgelegt sind.
- legen Sie Sonden mit nur einer Hand an.
- stellen Sie sicher, dass die Sonden keine anderen Kontakte berühren.

Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

Gefahren bei Leiterbenutzung

WARNUNG

Wenn Sie eine Leiter benutzen müssen, stellen Sie sicher, dass:

- der Boden im Bereich der Leiteraufstellung frei von Gegenständen ist, die zur Instabilität der Leiter führen könnten.
- Sie ALLE an der Leiter angebrachten Etiketten gelesen und verstanden haben.
- Sie die gesamte vorgeschriebene Sicherheitsausrüstung angelegt haben, wie Schutzhelm, Sicherheitsgeschirr usw.

Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

Gefahren durch Hochfrequenzstrahlung

WARNUNG

Der Leistungsverstärker ist in der Lage, eine hochgradige Mikrowellenstrahlung zu erzeugen, die körperliche Schäden verursachen kann. Stellen Sie vor der Inbetriebnahme sicher, dass:

- der mit der Wartung beauftragte Techniker keinen Schrittmacher trägt.
- alle Mikrowellenverbindungen sicher befestigt sind.
- kein Mikrowellenleck besteht.

Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

Vorsicht

Betreiben Sie den Verstärker niemals bei geöffnetem Hohlleiter. Die Hohlleiter- und Mikrowellenröhre sollte stets in einer Belastung enden, welche die volle HF-Leistung abzuleiten vermag. Nichtbefolgen könnte Beschädigung des Gerätes zur Folge haben.

Magnetfeld

Vorsicht

Eine Mikrowellenröhre hat ein sehr starkes magnetisches Feld. Die Röhre kann beschädigt werden, wenn sie in Kontakt mit magnetischen Objekten oder Werkzeugen kommt.

WAS SIE NICHT DÜRFEN:

- den Verstärker auf einer magnetischen Lagerfläche abstellen.
- für Aufbau, Wartung oder Reparatur magnetisches Werkzeug benutzen.

Nichtbefolgen könnte Beschädigung des Gerätes zur Folge haben.

Unpacking and Installation

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	ALCjr
2		Format changes	08/2001	ALCjr
3		Format change—Table of Contents, List of Figures, List of Tables	09/2001	ALCjr
A	9183	Original Release	10/12/2001	ALCjr
B	9434	Text adjustment page 8.	01/2402002	ALCjr
C	10490	Update to cover waveguide flange protection.	12/10/2002	ALCjr
D	11300	Add Air Duct System Requirements	08/08/2003	ALCjr
E	12678	Add note about HPA's without SSA's	12/01/2004	ALCjr
F	12715	Change to reflect absorptive vice reflective filtering for W/G	04/21/2005	JT
G	12927	Add German Language translation to comply with CE requirement.	07/06/2005	ALCjr
H	13469	Add Power Connector Wiring Diagram	10/10/2005	LD
J	13730	Add Three Phase Power Information	02/27/2006	RO
K	15180	Correct labeling for single phase power plug.	01/02/2007	LD
L	15260	Update Auxiliary Interface Connector Paragraph; move Figure 2 to page 8; Change figure title for Figure 3 to indicate female view, and update pin number order.	02/16/2007	AA

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Unpacking and Installation

Unpacking and Inspection

Inspect the inside and outside of the shipping container for signs of damage. If any shipping damage is detected, call the shipping carrier and submit a damage report.

Unpacking

Compare the packing list to the contents of the container to be certain that all enclosed material has been received. Save all data sheets. They will be useful during any maintenance actions. Save the shipping container and packing material and use it if you need to reship the unit.

Inspection

Inspect all items for any damage received during shipment. If shipping damage is detected, submit a damage report to the shipping carrier. Failure to submit a report may invalidate any future claims.

Mechanical Installation

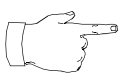
When performing the procedures in this section refer to the appendix titled *Mechanical Drawings*.

Rack Slide Installation

The amplifier is equipped with a pair of drawer slides. These slides mate with a pair of cabinet slide assemblies mounted in a standard 19-inch rack (cabinet).

The chassis slide assemblies are mounted to the cabinet with adjustable mounting brackets.

Note



Two chassis slide assemblies, four mounting brackets, four nutplates, and mounting screws are supplied with the amplifier.

The specific installation details are dependent upon the cabinet

design. Two front mounting brackets (3 inches long) and two back mounting brackets (9 inches long) are supplied. See appendix titled *Mechanical Drawings* for specific mounting instructions pertaining to your amplifier.

Waveguide Connection

The RF output waveguide port is located on the rear panel of the amplifier. Ensure that the proper matching waveguide flange is used to connect the amplifier output to the RF load. See Figure 1 “, Typical 4 Screw Mounting Flange Tightening Sequence“, and Figure 2, Typical 8 Screw Mounting Flange Tightening Sequence.

Caution

When not connected to the external waveguide system or a terminated load, waveguide flanges should be covered with a protective cap or tape that does not leave glue residue when removed. Xicom recommends the use of Kapton® tape, 3M Brand, #92, Xicom P/N 602-0001-001. Remove tape or cap prior to final installation. Failure to comply could result in contamination to the internal waveguide system or TWT and equipment damage.

Vorsicht

Wenn Hohlleiter-Flansche nicht mit dem externen Hohlleiter-System oder einer terminierten Belastung verbunden sind, sollten sie mit einer Schutzkappe oder Band abgedeckt werden, das beim Entfernen keine Kleberrückstände hinterlässt. Xicom empfiehlt die Verwendung von Kapton® Band, 3M Brand, #92, Xicom P/N 602-0001-001. Band oder Kappe vor der endgültigen Aufstellung entfernen. Nichtbefolgen könnte Verunreinigung des internen Hohlleitersystems oder Beschädigung von TWT und Gerät zur Folge haben.

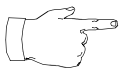
1 Position the interconnecting waveguide flange with the amplifier waveguide flange. Make sure that the flanges can be mated without strain or torsion.

2. If the two flanges cannot be properly aligned or if the installation is subject to vibration, a flexible waveguide

section should be utilized to eliminate potential strain on the waveguide connection.

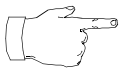
3. Insert any necessary gaskets and windows between the two flanges.

Note



The waveguide that is connected to the HPAs should have a good match of 1.5:1 or better for optimal performance. Waveguide connected to tri-band HPAs (C, X, Ku) and dual-band HPAs (C, Ku) in particular need to have this match. These HPAs do not contain isolators due to their bandwidths. Also, the in-band harmonics of excessive power reflected into the HPA can cause damage to the TWT. It is recommended that a transition is made to rectangular waveguide and an isolator used to assure a good match to the HPA and to absorb reflected powers at the harmonic frequencies. The typical output VSWR of isolators when included in the HPA is 1.3:1.

Note



If the connecting waveguide is to be pressurized at greater than 5 PSI, a waveguide window must be installed at the output flange of the amplifier. Use a conductive type gasket to preclude radiation leakage.

4. Start by hand tightening all waveguide mounting screws.
5. Tighten all mounting screws with the appropriate size Allen wrench.

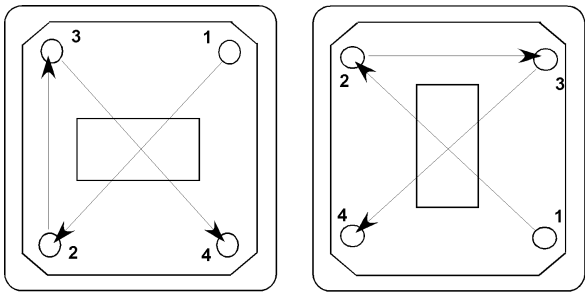
Caution

Do not overtighten the waveguide mounting screws. Overtightening may strip the threads in the waveguide flange. Failure to comply could result in equipment damage.

Vorsicht

Überdrehen Sie die Hohlleiter-Befestigungsschrauben nicht. Dadurch kann das Gewinde im Hohlleiter-Flansch ausreißen. Nichtbefolgen könnte Beschädigung des Gerätes zur Folge haben.

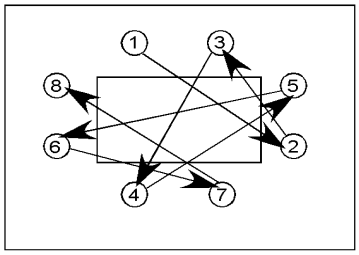
6. Use a sequential tightening procedure Proceed as follows:
   - Partially tighten one of the screws (#1).
   - Move the tool to the screw that is diagonally opposite to the screw tightened in step 1 (#2) and partially tighten that screw.
   - Move clockwise to the next screw to be tightened (#3) and partially tighten that screw.
   - Move to the screw diagonally opposite screw #3 and partially tighten that screw (#4).
   - If required, repeat this process for the remaining screws (#5-#6, #7-#8).
   - When you reach the first screw tightened in this step (#1) increase the torque on the screw and repeat the process until the screws have all been tightened to the correct torque.



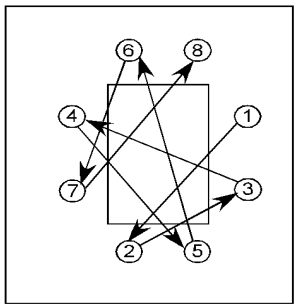
Horizontal Wave Guide Layout Vertical Wave Guide Layout

Figure 1, Typical 4 Screw Mounting Flange Tightening Sequence

Typical Torque Values	
10-32	30 inch-lb
6-32	10-12 inch-lb



Horizontal Wave Guide Layout



Vertical Wave Guide Layout

Figure 2, Typical 8 Screw Mounting Flange Tightening Sequence

Air Ducting Installation

The TWTA is cooled with an internal fan. Heated exhaust air should not be recirculated into the TWTA. The air intake and exhaust ports are located on the rear panel of the amplifier. A clearance of 6-8 inches is recommended to allow the heated exhaust air to clear the TWTA.

If the unit is installed in a closed cabinet or in a configuration that would tend to divert or block the exhaust air, provisions should be made to isolate the exhaust air from the intake air supply.

The Exhaust Port Guard can be removed and replaced with an air duct to carry the exhaust away from the TWTA. The air duct is available from XICOM Technology. See appendix titled *Mechanical Drawings*.

System Requirements

3 RU — Total air duct system (inlet and exhaust) pressure cannot exceed .1” of water at 100 CFM.

4 RU — Total air duct system (inlet and exhaust) pressure cannot exceed .1” of water at 150 CFM.

For specific design requirements of duct size, inlet or exhaust ports, filters, etc, please call Xicom Technical Support before unit is installed and operated.

Auxiliary Interface Connector

The Auxiliary Interface provides these interfaces for the use of the customer:

- Two sets of Form “C” Relay contacts for Summary Fault Indication
- External Interlock Input
- RF Inhibit Input
- 24 VDC @ 100mA maximum
- ±15V for monitoring purposes only.

The pinout of the Auxiliary connector is shown in Table 1, Auxiliary Connector Pinouts.

External Interlock

The External Interlock (Pin 13) must be shorted to the External Interlock Return (Pin 11) for the amplifier to operate. Removing the short causes an External Interlock fault and turns High Voltage OFF.

RF Inhibit Control

RF is inhibited when RF Inhibit (Pin 12) is connected to Ground (Pin 9 or optionally, pin 10). The amplifier inhibits RF by removing the bias voltage to the SSA, thereby eliminating the RF drive to the TWT.

Note

For amplifiers without SSA's the RF inhibit function will turn off high voltage eliminating the RF amplification of the input signal.

The amplifier can be factory configured on customer request to inhibit RF when the connection to ground is removed.

Figure 3, Front View of 15-Pin Connector (Female), shows the pin layout and Table 1, Auxiliary Connector Pinouts lists the pin definitions, functions, and comments for the Auxiliary Interface Connector.

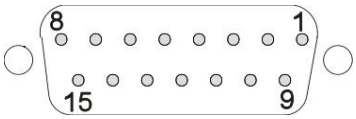


Figure 3, Front View of 15-Pin Connector (Female)

Table 1, Auxiliary Connector Pinouts

Pin Nr.	Definition	Comments
1	+24 VDC	Available for external use.
2	+24 VDC	Current limit of 100mA.
3 (Note 1)	Summary Fault 1	Normally Open. Closes when fault occurs.
4	Summary Fault 1	Normally Closed. Opens when fault occurs.
5	Summary Fault 1	Common, Fault 1
6 (Note 2)	Summary Fault 2	Common, Fault 2
7	Summary Fault 2	Normally Open. Closes when fault occurs.
8	Summary Fault 2	Normally Closed. Opens when fault occurs.
9	Ground	
10	Ground	
11	External Interlock Return	Pin 11 must be connected to Pin 13 to enable High Voltage ON.
12	RF Inhibit	Connect Pin 12 to Pin 9 or Pin 10 to inhibit RF Output.
13	External Interlock	Pin 13 must be connected to Pin 11 to enable High Voltage ON
14	+15 VDC	Monitor Only
15	-15 VDC	Monitor Only.

Note 1: Pins 3,4,5 —Form C contacts. Fault 1, Summary Fault.
Note 2: Pins 6,7,8 — Form C contacts. Fault 2, Summary Fault (Used for redundant systems).

Summary Fault Indicators

Two sets of Form C relay contacts (Summary Fault 1 and Summary Fault 2) are used to indicate that a fault has occurred.

The Summary Fault 1 indicator signals change state any time an amplifier fault occurs. The user has the choice of a normally open or normally closed circuit.

The Summary Fault 2 indicator signals change state any time a summary fault occurs. The user has the choice of a normally open or normally closed circuit.

Output Voltage

A + 24 VDC voltage is supplied that can deliver up to 100 mA. This supply voltage is available on both Pins 1 and 2. The return for this voltage is either Pin 9 or Pin 10.

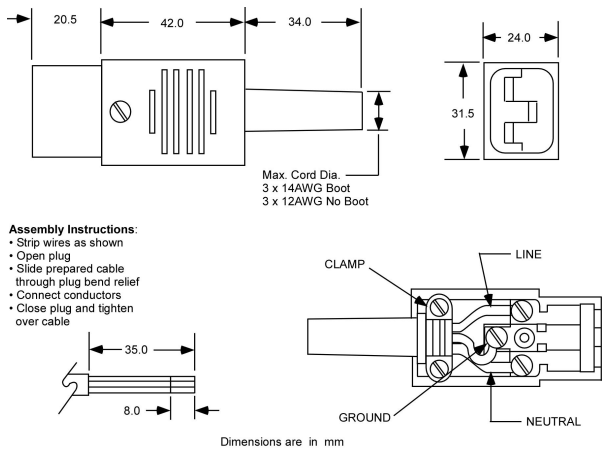
Power and Interface Interconnections

When performing the procedures in this section refer to the Wiring and Interconnect Drawings for your specific amplifier. These drawings are located in the appendix titled *Interconnect Drawings*.

Prime Power Connections

Single Phase Units

The AC Prime Power receptacle is located on the amplifier rear panel. See the appendix titled *Specification* for nominal line voltage and prime power connects. Figure 4 shows the plug wiring diagram.



POWER PLUG WIRING COLOR CODE

LEAD	AMERICAN	INTERNATIONAL
LINE	Black	Brown
NEUTRAL	White	Blue
GROUND	Green	Green/Yellow

Figure 4, Power Plug Wiring Diagram

Three Phase Units

Phase orientation must be verified on initial installation. If the phase orientation is not correct the amount of air flow will be greatly reduced. Three phase units have a pressure switch that senses the TWT air flow. If the phase orientation is incorrect the HPA will shut down indicating a TWT Temperature fault. Refer to the appendix titled *Specifications* for nominal line voltage and prime power connections. If repeated TWT Temperature faults occur during initial turn on you will need to reverse a phase pair.

Generally the AC Prime Power receptacle is located on the rear of the amplifier.

Figure 5 through Figure 8 show diagrams of three phase connections.

Table 2 through Table 5 delineate the pinouts for the three phase connections.

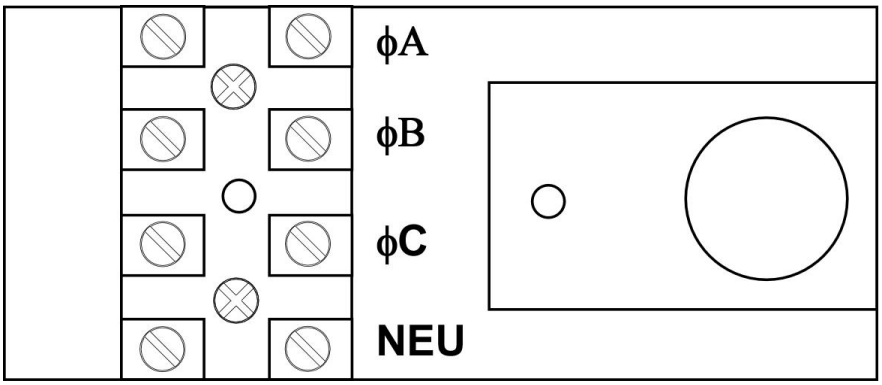


Figure 5, Three Phase Delta Connection (NEU — Not Used) into Terminal Block

Table 2, Three Phase Delta Connection Pinouts

Terminal	Connection
ϕA	Phase A
ϕB	Phase B
ϕC	Phase C
ϕNEU	No Connection

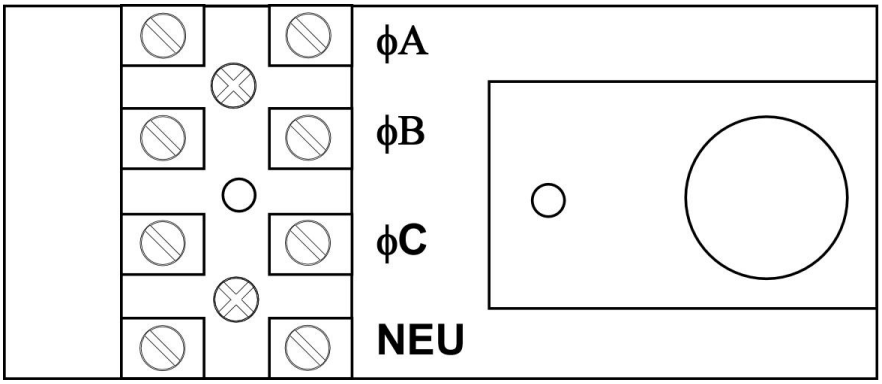


Figure 6, Three Phase Wye Connection (NEU — Neutral) into Terminal Block

Table 3, Three Phase Wye Connection Pinouts

Terminal	Connection
ϕA	Phase A
ϕB	Phase B
ϕC	Phase C
ϕNEU	Neutral

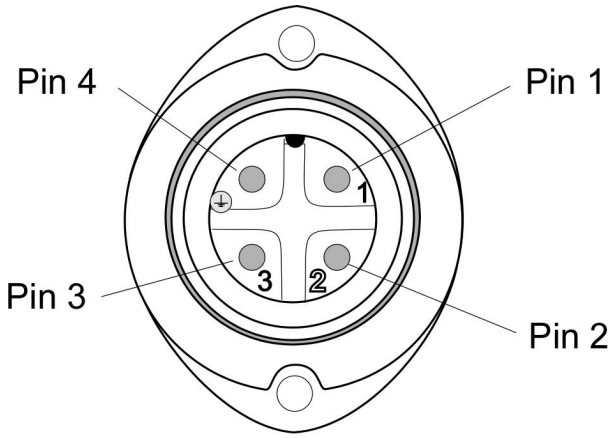


Figure 7, Three Phase Delta Connection into Amphenol Connector

Table 4, Three Phase Delta Connection Pinouts (Amphenol)

Pin	Connection
1	Phase A
2	Phase B
3	Phase C
4	Ground

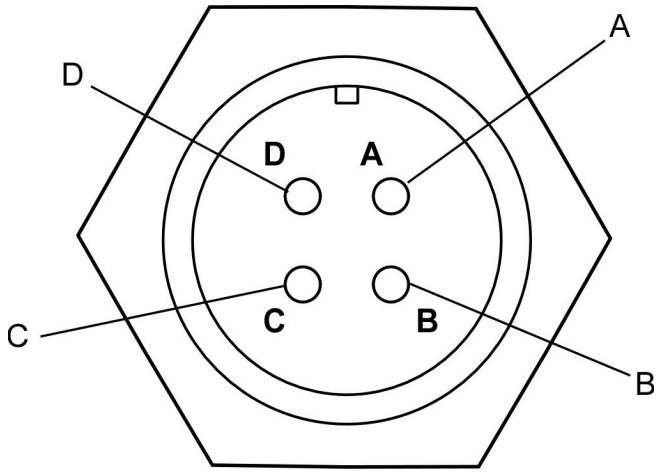


Figure 8, Three Phase Delta Connection into MS type connector

Table 5, Three Phase Delta Connection into MS type Connector

Terminal	Connection
A	Phase A
B	Phase B
C	Phase C
D	No Connection

Serial Interface Ports

Dual serial interface connectors (COM1 and COM2), located on the rear panel of the amplifier are available for remote control operation. Both serial interface ports are always enabled. The amplifier will respond to commands from either interface. The

last command received has precedence.

COM1 is an RS-232 only serial interface. No switch settings are required for COM1. Table 6, RS-232 Pinouts, lists the pinouts for COM1.

Table 6, RS-232 Pinouts

Pin No.	Function
1	No Connection
2	RXD—Received Data (from Controller)
3	TXD—Transmitted Data (to Controller)
4	No Connection
5	Ground and Signal Return
6	DSR—Request to Send Ready (Controller)
7	RTS—Request to Send (Amplifier)
8	CTS—Clear to Send (Amplifier)
9	No Connection

COM2 can be configured (with the set of dip switches on the rear panel) as an RS-485 2-wire serial interface or as an RS-485 4-wire serial interface. The pinouts for the COM2 interface are listed in Table 7, Pinouts for the COM2 Intereface, and typical implementations are shown in Figure 9, Typical RS-485 2-Wire Duplex Implementation and Figure 10, Typical RS-485 4-Wire Full Duplex Implementation.

The COM2 Setup Switches are used to configure the COM2 serial interface. Switches 1, 3 and 4 are used for COM2 setup. Switches 2, 5, 6,7 and 8 are not used. Table 8 lists the settings for the COM2 Setup Switches.

Table 7, Pinouts for the COM2 Intereface

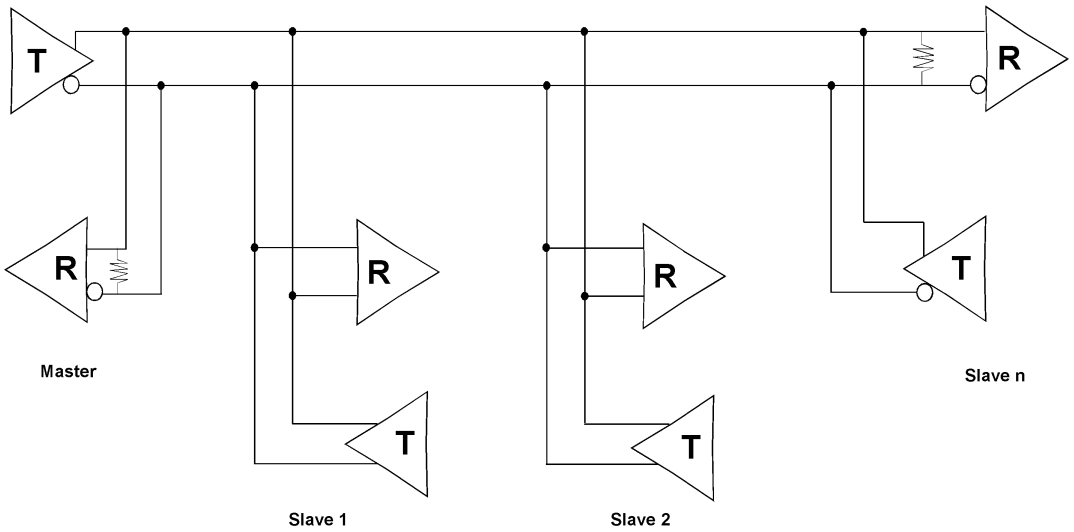
Pin No.	RS-485 2-Wire System	RS-485 4-Wire System
1	(-) Data	(-) Transmit Data
2	(-) Data	(-) Receive Data
3	No Connection	No Connection

Table 7, Pinouts for the COM2 Intereface

Pin No.	RS-485 2-Wire System	RS-485 4-Wire System
4	No Connection	No Connection
5	Ground	Ground
6	(+) Data	(+) Transmit Data
7	(+) Data	(+) Receive data
8	No Connection	No Connection
9	No Connection	No Connection

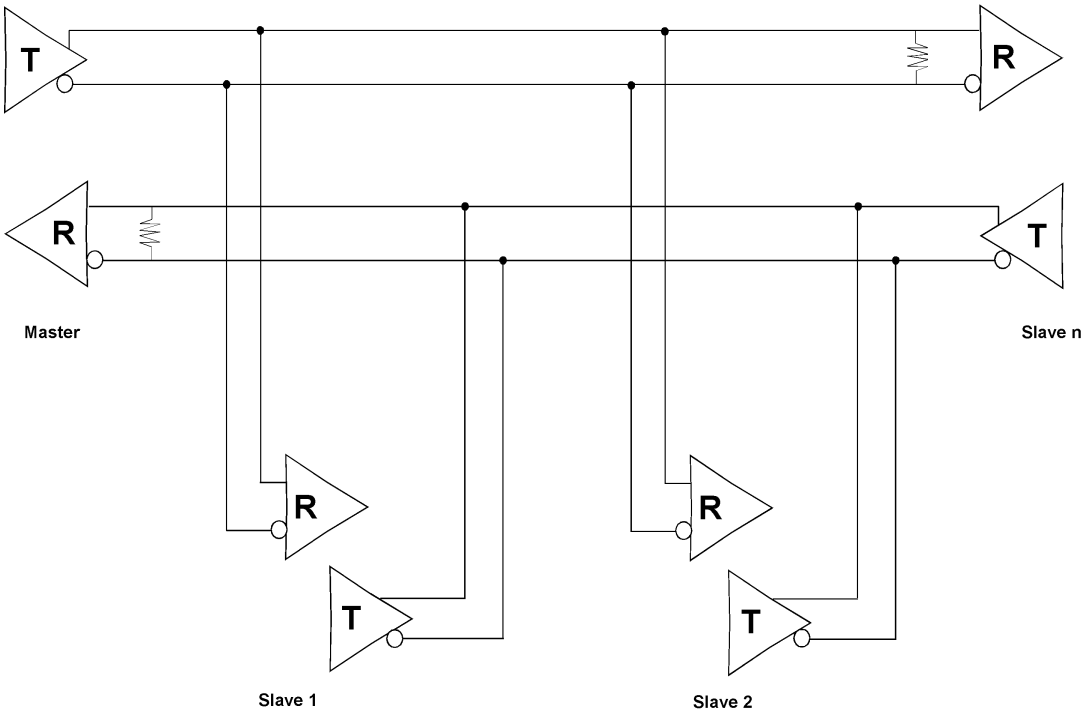
Table 8, COM2 Switch Settings

Switch No.	Setting for RS-485 Serial Interface
1	Termination for RS-422/ 485 BUS ON-ON OFF-OFF
2	Not Used
 	**Caution** To prevent shorting the transmit signal to ground do not turn switch 3 and switch 4 ON at the same time. Failure to comply could result in equipment damage. **Vorsicht** Um zu verhindern, dass das Übertragungssignal gegen Erde kurzgeschlossen wird, drehen Sie Schalter 3 und 4 nicht gleichzeitig auf EIN. Nichtbefogen könnte Beschädigung des Gerätes zur Folge haben.
3	RS-485 2-wire Mode—ON RS-485 4-Wire Mode—OFF
4	RS-485 2-Wire Mode—OFF RS-485 4-Wire Mode—ON
5	Not Used
6	Not Used
7	Not Used
8	Not Used



First and last device on the chain should be terminated.

Figure 9, Typical RS-485 2-Wire Duplex Implementation



First and last device on the chain should be terminated.

Figure 10, Typical RS-485 4-Wire Full Duplex Implementation

Grounding

WARNING

To prevent Electric Shock the amplifier should be securely connected to the grounding stud. Failure to comply could result in personnel injury or death.

WARNUNG

Zur Vermeidung elektrischer Schläge sollte der Verstärker fest mit dem Erdungsbolzen verbunden sein. Nichtbefolgen kann die Verletzung oder den Tod von Menschen zur Folge haben.

Operation, Rack and Digital HPAs

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Incorporate changes created by Firmware 4.14	08/2001	A.L. Crozier, Jr.
3		Format Change—Table of Contents, List of Figures, List of Tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/21/2001	A.L. Crozier, Jr.
B	9294	Add WRemote information and adjust for ODU coverage	11/2001	A.L. Crozier, Jr.
C	10095	Incorporate changes created by Firmware 4.17	07/16/2002	A.L. Crozier, Jr.
D	10388	Editorial Update	11/05/2002	A.L. Crozier, Jr.
E	10904	Update Front Panel Operation to reflect Firmware changes.	03/19/2003	A.L. Crozier, Jr.
F	11300	Editorial Changes	08/08/2003	A.L. Crozier, Jr.
G	12929	Add German Language Translation for CE Compliance	05/12/2005	A.L. Crozier, Jr.
H	17044	See ECO	05/14/2010	J. Neill

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Operation, Rack and Digital HPAs

Overview

The Xicom Digital M&C System, which is incorporated into all Xicom XTD and XTRD series amplifiers provides a common user interface for the entire line of Microwave Tubes. The M&C system can be accessed from the front panel of the rackmount amplifiers or via a serial remote control interface on either a rackmount or ODU amplifier. This chapter discusses the user interface, the Xicom Digital M&C System menu tree, and the individual menus and screens available from a remote PC running WRemote.

WRemote

WRemote is a Windows Operating System based program that simulates the front panel of a rackmount amplifier. This program controls both rackmount and digital ODU amplifiers. WRemote is available from Xicom Technology (Xicom part number: 809-0001-001).

Controls and Indicators

The amplifier is controlled by a microprocessor that responds to commands from the front panel of rackmount amplifiers (LOCAL) or commands from a digital controller connected to the serial interface port (COM1 or COM2) of the amplifier (REMOTE). The menus/screens displayed are generated by the installed firmware. The menus/screens and the full set of amplifier commands are discussed in the paragraphs “Menu and Screen Descriptions” on page 13 and “Menutrees” on page 40.

The communication protocols for the remote control serial interfaces are described in the Chapter titled *Amplifier Communication and Protocol*.

The LED Display is shown in Figure 1 on page 8.

The LED indicators are summarized in Table 1 on page 8.

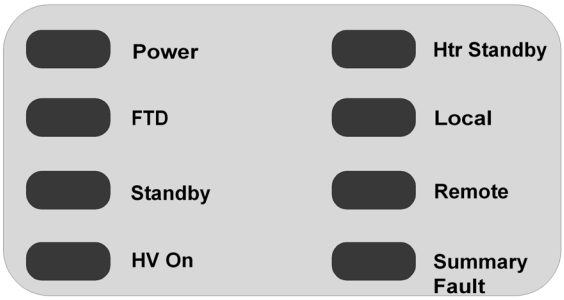

Figure 1, Rackmount Front Panel LED Display

Table 1, LED Indicator Definitions

Nomenclature	Color	Functional Description (When lit)
Power	Green	Indicates AC Power Switch (circuit breaker) is ON, and prime power is applied to amplifier.
FTD	Amber	Filament Time Delay cycle (FTD) in process. Goes dark when cycle completed. Typically a 3 minute cycle.
Standby	Amber	Amplifier in “ready” state. High voltage can be turned ON. Mode is deactivated when High Voltage is turned ON.
HV ON	Green	Indicates high voltage is ON.
Htr Standby	Amber	Indicates amplifier in Heater Standby Mode. Mode is deactivated when High Voltage is turned ON.
Local	Green	Amplifier in LOCAL
Remote	Green	Amplifier in REMOTE
Summary Fault	Red	Amplifier is faulted.

Front Panel Display and Softkeys

The display is four lines by twenty characters. The display shown in Figure 2 is the Status 1 menu. The information displayed is generated by the amplifier microprocessor. The softkeys are shown to the right of the display. The softkeys are associated with the display line to the left of the softkey. For example, the top softkey (Softkey No.1) is associated with the top line of the display.

A discussion of the function of each associated softkey is included with the discussion of each menu or screen. A compressed menutree showing all the menus and screens is included as Figure 18, Figure 19, and Figure 20 as an aid to the operators.

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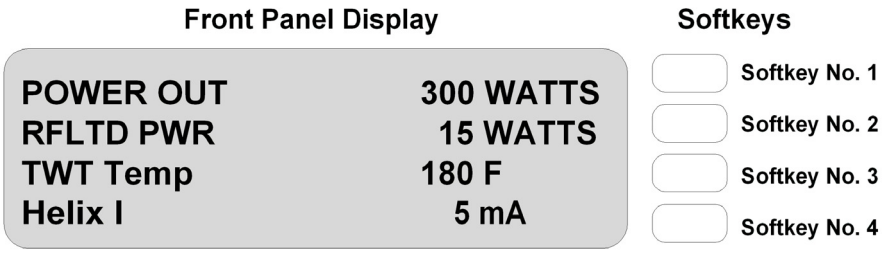

Figure 2, Status Menu 1 Display and Softkeys

Front Panel Keyboard

Referring to Figure 3 there are six special function keys and a 10-key pad. The functions of these keys are summarized in Table 2 on page 10.

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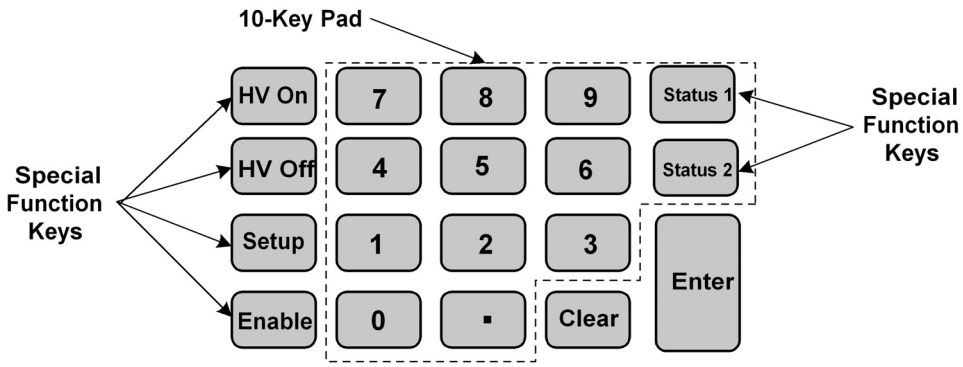
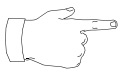


Figure 3, Front Panel Keyboard,

Table 2, Keyboard Functions

Key Name	Function
HV On	Pressed to set amplifier high voltage ON (Used in conjunction with Enable key when Enable key is ON.)
HV OFF	Pressed to set amplifier high voltage OFF (Used in conjunction with Enable key when Enable key is ON.)
Setup	Pressed to display SETUP Menu 1 (Always used in conjunction with Enable key.)
Enable	When ON (via one of the default menus) used in conjunction with other special function keys.
10-Key Pad	Used to enter numeric values on selected screens
Status1	Pressed to display Status 1 Menu.
Status2	Pressed to display Status 2 Menu.
Enter	Multi-function key: When numeric entry required, pressed to accept the value entered Pressed to go back one level from the current screen.
Clear	Pressed to clear numeric entries before Enter key pressed.

Note



The convention used in the text to indicate a front panel key is [**Keyname**] key.

Enable Key

The [**Enable**] key is a safety feature that prevents accidental activation of critical functions such as gain control, high voltage control, and amplifier setup. When the [**Enable**] key is set to **ON**, it must be used in conjunction with the **Gain** control, the [**HV On**], [**HV Off**]. The **[Enable]** key must be used in conjunction with the [**Setup**] key at all times.

Gain Control

The **Gain** control is used to adjust the RF output of the amplifier. When rotated, the control converts the rotary motion into a digital command to the amplifier microprocessor. The **Gain** control is used in conjunction with [**Enable**] key when the [**Enable**] key is **ON**.

AC Power Switch

The **AC Power Switch**, which is a circuit breaker, is located on the rear panel of the amplifier. The switch toggle is pressed UP to apply prime power to the amplifier.

Note

The AC Power Switch on multiple drawer TWTA Racks is located on the rear panel of the Power Supply Drawer Assembly.

Conventions

The conventions used in this guide in the presentation of the menus and screens is shown in Figure 4.

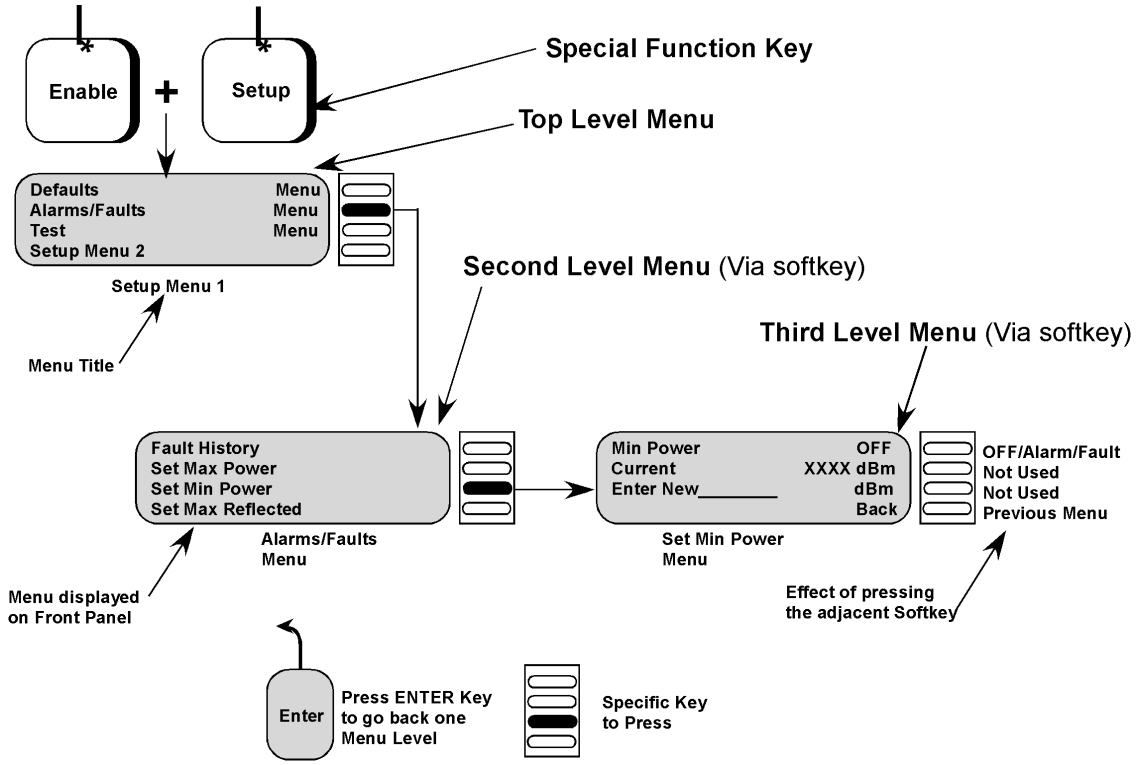


Figure 4, Menu Presentation Conventions

Record of Operating Parameters

As a convenience for the user, an operating parameter summary table that can be used for multiple amplifiers is provided in Table 3.

Table 3, Summary Record, Amplifier Operating Parameters

Parameter	Amplifier No. 1	Amplifier No. 2	Amplifier No. 3	Amplifier No. 4	Amplifier No. 5	Amplifier No. 6
Poll Address						
RF Output Power Setting Watts dBm dBw						
Max. Refl Power? Set Point* Alarm On/Off Fault On/Off						
Maximum Power? Set Point Alarm On/Off Fault On/Off						
Minimum Power? Set Point Alarm On/Off Fault On/Off						
Constant Power? Set Point Alarm On/Off Fault On/Off						
Offset Factor						
COM1? Baud Rate						
COM2? Baud Rate						
Enable Key?						

* Set Point = Alarm and/or Fault Set Point

? Enter Yes or No

Menu and Screen Descriptions

There are four functional groups of menus and screens:

1 The Status 1 Menus and Screens
2. The Status 2 Menus and Screens
3. The Setup Menus and Screens
4. The Fault Menus and Screens

Startup Screen

When The **AC Power Switch** is set to ON, the *Startup Screen* is displayed for a few seconds, then the *Startup Screen* is replaced by the *Status 1 Menu.*

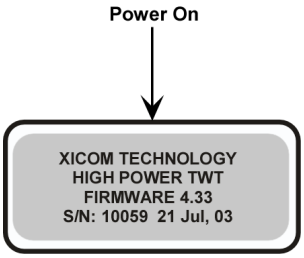


Figure 5, Startup Screen

Figure 5 is an example of a Startup Screen; Figure 6 is the Status 1 Menu.

To return to the startup screen from either Status 1 or Status 2 Screen, press **[Enter]** Key

Status 1 Menu

The *Status 1 Menu* is the first menu displayed when the amplifier powers up. Pressing any Status 1 Menu softkey does not change amplifier operation. There are two ways to display the *Status 1 Menu*:

1 Power-up the amplifier
2. Press the [**Status1]** key.

The RF power data (POWER OUT) is real time data that tracks any changes of the RF output.

Two of the *Status 1 Menu* softkeys are active. The functions of the active *Status 1 Menu* softkeys are:

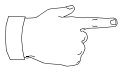
[**Softkey 1]--**Temporarily changes the units used for the RF power data display. Cycles one step each time [Softkey1] key is pressed. There are three data displays available.

Step sequence is:

Watts dBm dBw Watts

[**Softkey 3]--**Temporarily changes the temperature units used for the temperature data display. Toggles between degrees F (Fahrenheit) and degrees C (Centigrade) each time [Softkey 3] is pressed.

Note



When High Voltage Is ON the Status 1 Screen shows:

- Power Out
- Rfltd Pwr
- TWT Temp
- Helix I

Press and Hold [**Enable**]. The screen displays Atten Set.

When High Voltage is OFF the Status 1 Screen shows:

- HV OFF
- Atten Set
- TWT Temp
- Helix I

Pressing and Holding [**Enable**] has no effect.

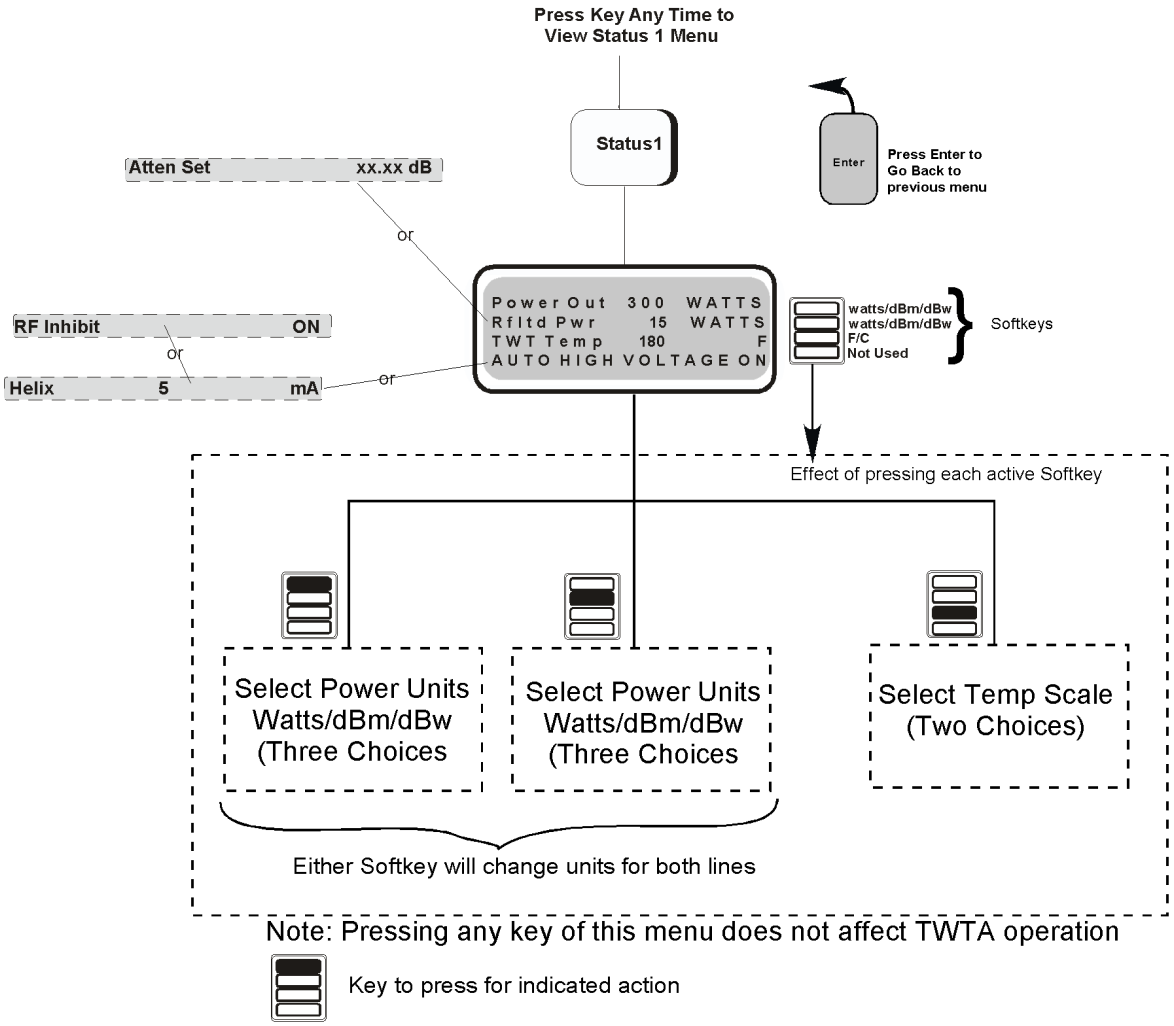


Figure 6, Status 1 Menu

Note

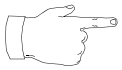
The information within the dotted portion of Figure 6 is for illustrative purposes only. This information is not displayed on the amplifier front panel display

The bottom line of the STATUS 1 Menu can have three different messages:

- If the amplifier is set up to automatically turn high voltage ON when prime power is applied, the message will be

AUTO HIGH VOLTAGE ON

Note



To disable AUTO-HIGH VOLTAGE ON, press the softkey to the right of the message. This can be done any time during the filament time delay process.

- If RF Inhibit is ON and High Voltage is ON, the message will be:

RF Inhibit ON

- If neither of the above conditions exist, the message will be

Helix XX. X mA

where X = actual helix current in mA

Status 2 Menus and Screens

Status 2 Menu

The *Status 2 Menu* (top menu of Figure 7) is displayed any time the [**Status2]** key is pressed. Only [**Softkey 4**] is active. This menu displays three amplifier parameters that cannot be changed by the user:

HelixV—Current Helix Voltage (Cathode Voltage) in kilovolts.

Heater—Total time (in hours) voltage has been applied to the TWT heater (filament).

Beam—Total time high voltage has been applied to the TWT.

When [**Softkey 4**] is pressed, the *Display All Menu* is displayed. See Figure 7.

Display All Menu

This menu presents summary amplifier data:

Power Out—The current RF output power of the amplifier. The RF output is continuously monitored and displayed on this menu.

Atten Set—The current attenuator setting. This is only available when High Voltage is OFF.

RFLTD PWR—The current value of reflected power present at the output of the amplifier. Reflected power is continuously monitored and displayed on this menu. This is only available when High Voltage is ON.

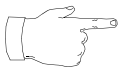
Ew—Current Helix Voltage.

Iw—Current Helix Current.

Ef—Current Heater Voltage.

Temp—Current TWT collector temperature in either Fahrenheit or Centigrade.

Note



The default values for the units displayed on the Status 2 Menu is set via the Setup Menus which are discussed later in this chapter.

Three of the softkeys of the *Displayall Menu* are active. The functions of these three softkeys are:

[Softkey 1]—Temporarily changes the units used for both the RF Output and RF Reflected Power displays. Cycles one step each time [Softkey1] is pressed. The sequence of the steps is:

Watts dBm dBw Watts, etc.

[Softkey 2]—Same as [Softkey 1].

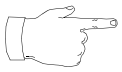
[Softkey 4]—Temporarily changes the temperature units used for the temperature data display. Toggles between degrees F (Fahrenheit) and degrees C (Centigrade.)

The [**Enter**] key is pressed to go back to the *Status 2 Menu* from the *Displayall Menu*.

The third line of the Displayall Menu shows the Helix Voltage (Ew) in kilovolts (DC) and the Helix Current (Iw) in milliamperes.

The fourth line of the display shows the Heater Voltage (Ef) and the TWT collector temperature (Temp) in Fahrenheit or Centigrade.

Note



The information within the dotted portion of Figure 7 is for illustrative purposes only. This information is not displayed.

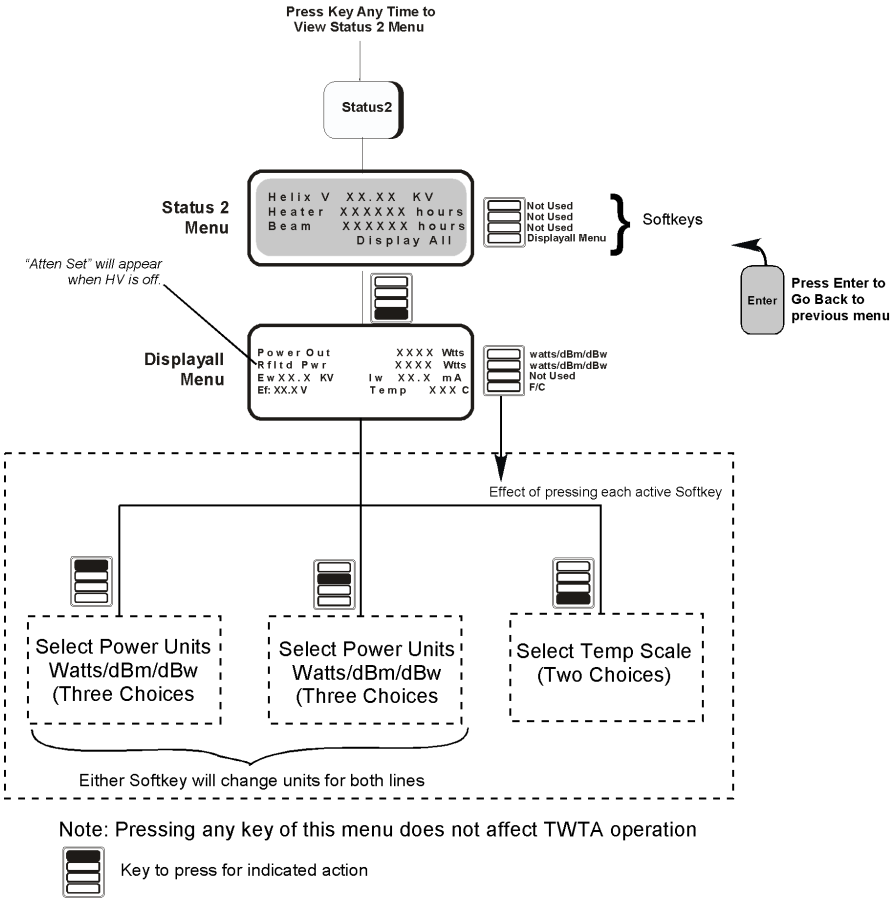


Figure 7, Status 2 and Displayall Menus

Setup Menu System

The Setup Menus are used to customize the amplifier to meet user interface and operational requirements. Entries made via the Setup Menus change the amplifier default parameters and operation. These menus are used to:

- Set the power-up defaults.
- Configure the serial port interface.
- Enable alarms and faults.
- Set alarm/fault trip levels.
- View run-time and fault histories.
- Test the amplifier alarms, faults, and LEDs.

There are five setup menus, *Setup Menu 1, Setup Menu 2, Setup Menu 3, Setup Menu 4, and Setup Menu 5.* A special function key [**Setup**] is used to access the setup menus. Two keys, [**Enable**]+[**Setup**], are pressed to access the Setup Menus when [**Enable**] is set to ON.

Setup Menu 1

Setup Menu 1, Figure 8 is an intermediate menu. All four softkeys of the *Setup 1 Menu* are active. The *Setup 1 Menu* softkey functions are:

[Softkey 1]—Pressed to access the *Default 1 Menu*

[Softkey 2]—Pressed to access the *Alarms/Faults Menu*.

[Softkey 3]—Pressed to access the *Test Menu.*

[Softkey 4]—Pressed to access *Setup Menu 2.*

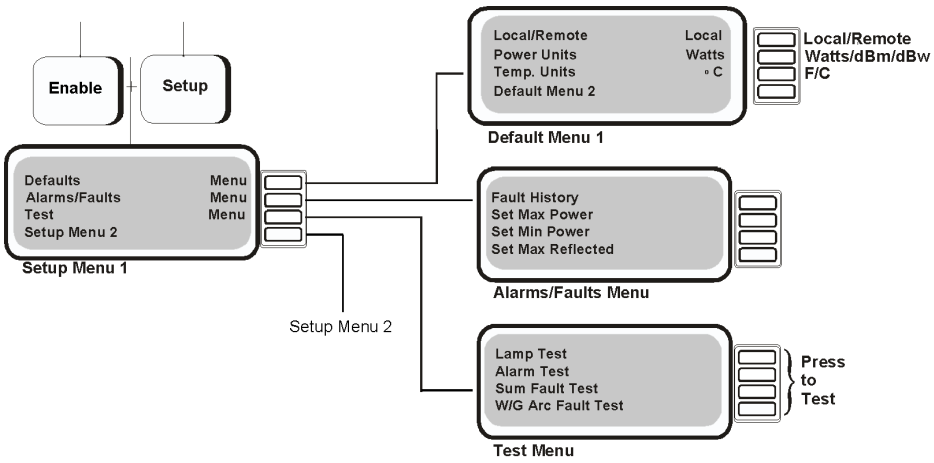


Figure 8, Setup Menu 1

Default Menus

There are two default menus, Figure 9 that allow you to set the default parameters for the amplifier. *Default Menu 2* is accessed from *Default Menu 1*.

Default Menu 1

The functions controlled by the *Default 1 Menu* are listed in the menu. All four softkeys are active. The *Default 1 Menu* softkey functions are:

[Softkey 1]—Toggles between LOCAL and REMOTE. Factory default is LOCAL. When in Remote the amplifier status cannot be controlled; that is, turn high voltage on or off from the front panel.

[Softkey 2]—Changes the default values for the units used for the RF power data display. Cycles one step each time [Softkey2] key is pressed. Step sequence is:

Watts dBm dBw Watts (Factory default is dBm.)

[Softkey 3]—Toggles temperature scale between degrees F (Fahrenheit) and degrees C (Centigrade). Factory default is C (Centigrade).

[Softkey 4]—Accesses *Defaults Menu 2*.

Default Menu 2

The functions controlled by the *Default Menu 2* are listed in the menu. All four softkeys are active. The *Default Menu 2* softkey functions are:

[Softkey 1]—Toggles **Heater Standby** ON and OFF. Factory default is ON.

[Softkey 2]—Toggles the [**Enable**] key ON and OFF. When Enable is set to ON:

- Both the [**Enable**] key and the [**HV ON**] key must be pressed at the same time to set high voltage On.
- Both the [**Enable**] key and the [**HV OFF**] key must be pressed at the same time to set high voltage OFF.

The [**Enable**] key must be pressed to enable the front panel GAIN control.

When [**Enable**] is set to OFF, only the special function keys are used to access the indicated functions.

Factory default [**Enable**] key is set to ON.

[Softkey 3]—Toggles between Automatic High Voltage ON at power up (startup) and High Voltage Off at power up. When ON, high voltage ON is enabled when the FTD cycle is complete. Factory default is OFF.

WARNING

There are no high voltage interlocks installed on the ODU amplifiers. To prevent electric shock when performing maintenance, turn the **AUTO HIGH VOLTAGE ON** function OFF. Failure to comply could result in serious injury or death.

WARNUNG

In die ODU Verstärker sind keine Hochspannungs-Verriegelungsschalter eingebaut. Schalten Sie zur Vermeidung von elektrischen Schlägen bei der Wartung die Anzeige **AUTO HOCHSPANNUNG EIN** auf AUS. Nichtbefolgen könnte schwere Verletzungen oder Tod zur Folge haben.

WARNING

To prevent electric shock when using the **HV ON @ Startup** mode verify that the TWTA cover is securely in place. Failure to comply could result in injury or death.

WARNUNG

Vergewissern Sie sich zur Vermeidung elektrischer Schläge vor Benutzung des **HV ON @ Startup** Modus, dass die TWTA Abdeckung fest angebracht ist. Nichtbefolgen könnte Verletzung oder Tod zur Folge haben.

WARNING

To prevent burns from high power radio frequency emissions verify that the output wave guide is properly connected. Failure to comply could result in serious injury.

WARNUNG

Vergewissern Sie sich, dass der Ausgangshohlleiter richtig angeschlossen ist, damit Verbrennungen durch starke Hochfrequenzausstrahlungen vermieden werden. Nichtbefolgen könnte schwere Verletzungen zur Folge haben.

[Softkey 4]—Pressed to access the *Buzzer Volume Menu.* This menu allows the user to enable or disable the audio alarm and to see the volume level of the alarm signal.

Buzzer Volume Menu

The *Buzzer Volume Menu* (Figure 9) allows you to enable or disable the audio alarm and to set the volume level of the alarm.

Three of the softkeys of the *Buzzer Volume Menu* are active. The *Buzzer Volume Menu* softkey functions are:

[Softkey 1]—Controls the audio alarm. Toggles between ON and OFF. Factory default is ON.

[Softkey 2]—Not Used. Value shown on the line to the left of this softkey is the current volume level setting. (one of eight steps)

[Softkey 3]—Pressed to increase audio alarm volume. When this key is pressed, the audio alarm is activated at the volume level established when the softkey is pressed. Factory default is 8.

Note

There are eight possible volume levels. The lowest volume is Level 1 and the highest volume is Level 8. The value displayed on line 2 of the menu changes each time [**Softkey 3**] or [**Softkey 4**] is pressed.

[Softkey 4]—Pressed to decrease audio alarm volume.

Press [**Enter**] to return to *Default Menu 2*.

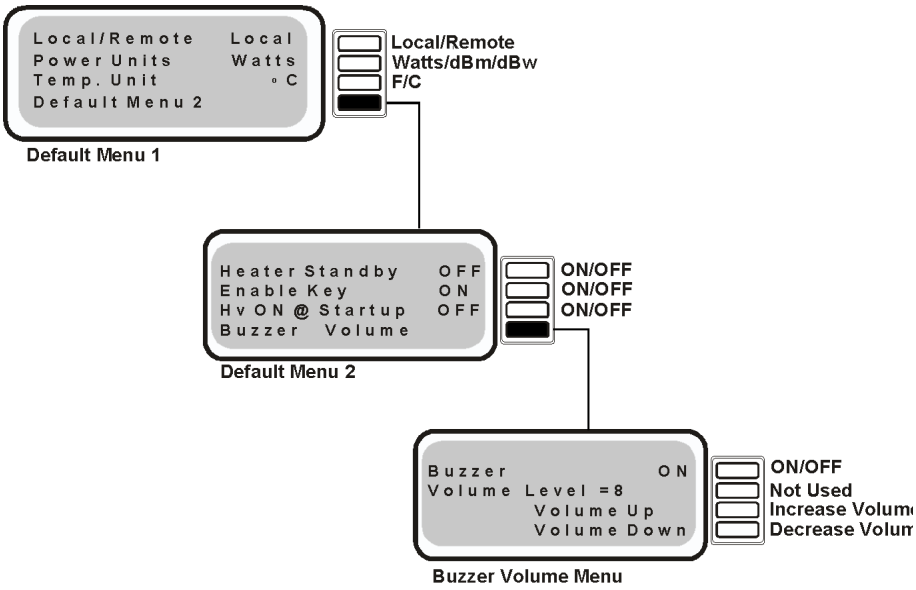


Figure 9, Default Menus

Exiting the Default Menus

There are three ways to exit the Default Menus:

1 Press the [**Enter**] key to return to the Setup 1 Menu.
2. Press the [**Status1**] key to go to the Status 1 Menu.
3. Press the [**Status2**] to go to the Status 2 Menu.

Alarms/Faults Menu

As shown in Figure 10 the *Alarms/Faults Menu* is an intermediate menu that provides access to the four sub-menus. All four of the *Alarms/Faults Menu* softkeys are active. The functions of the *Alarms/Faults Menu* softkeys are:

[Softkey 1]—Pressed to access the *Fault History Menu.* This menu allows the user to review a listing of the last 100 faults. The faults are listed in reverse order of occurrence, with the last fault to occur at the top of the list. Use the gain control to scroll through the listing.

[Softkey 2]—Pressed to access the *Set Max Power Menu*. This menu allows the user to set the trip point at which an alarm or fault will occur when the RF output exceeds the value set for the trip point.

[Softkey 3]—Pressed to access the *Set Min Power Menu.* This menu allows the user to set the trip point at which an alarm or fault will occur when the RF output falls below the value set for the trip point.

[Softkey 4]—Pressed to access *Set Max Reflected Power Menu.* This menu allows the user to set the trip point at which an alarm or fault will occur when reflected power exceeds the value set for the trip point.

Fault History Menu

Note

The first column, **F** (Fault) or **A** (Alarm) will appear, the fault log abbreviation appear in the 2nd column, see Table 4 the 3rd displays the year, month and day and the last column displays the time.

This menu provides user access to the fault history of the amplifier. A record of up to 100 faults is maintained. The latest fault is placed at the top of the list. When the number of faults

exceeds the allowed number, the oldest entry is dropped. The **GAIN** control knob is used to scroll through the list of faults.

Press [**Enter**] to return to the Alarms/Faults Menu.

Set Max Power Menu

The *Set Max Power Menu*, Figure 10 allows you to control the maximum power detection circuits.

The front panel 10-key pad and three of the softkeys of the *Set Max Power Menu* are active. The front panel 10-key pad is used to enter the desired maximum power level.

Entries are in the units shown on the second line. Press [**Clear**] to clear your entry. Press [**Enter**] to accept your entry.

The *Set Max Power Menu* softkey functions are:

[Softkey 1]—Cycles one step each time the softkey is pressed. The step sequence is:

OFF ALARM FAULT OFF etc.

The three choices are:

OFF — Disables the alarm and fault detection functions.

ALARM — Enables the maximum power-detection circuit alarm. The display will show the Alarm and the buzzer will sound but the amplifier will stay on.

FAULT — Enables the maximum power fault detection circuit. The display will show a Fault; the buzzer will sound and the high voltage will shut off.

[Softkey 2]—Not Used. Numeric value shown on the line to the left of this softkey is the current power level setting.

[Softkey 3]—Not Used (Value you enter from the keypad is displayed to the left of this key.)

Entries are in the units shown on the second line.

[Softkey 4]—Pressed to return to the *Alarms/Faults Menu*.

Set Min Power Menu

The *Set Min Power Menu* (Figure 10) allows you to control the minimum power detection circuits.

The front panel 10-key pad and three of the softkeys of the *Set Min Power Menu* are active. The front panel 10-key pad is used to enter the desired minimum power level.

Entries are in the units shown on the second line. Press [**Clear**] to clear your entry. Press [**Enter**] to accept your entry.

The *Set Min Power Menu* softkey functions are:

[Softkey 1]—Cycles one step each time the softkey is pressed. The step sequence is:

OFF ALARM FAULT OFF etc.

These three states are:

OFF — Disables the minimum power detection circuit alarm and faults,

ALARM — Enables the minimum power detection circuit alarm. The display will show the Alarm and the buzzer will sound but High Voltage will NOT be shut off.

FAULT— Enables the minimum power fault detection circuit. The display will show Fault; the buzzer will sound and the High Voltage will shut off.

[Softkey 2]—Not Used. Numeric value shown on the line to the left of this softkey is the current minimum power level setting.

[Softkey 3]—Not Used. (Value you enter from the keypad is displayed to the left of this key.)

Entries are in the units shown on the second line.

[Softkey 4]—Pressed to return to the *Alarms/Faults Menu*.

Set Maximum Reflected Power Menu

The *Set Max Reflected Power Menu* (Figure 10) allows you to control the maximum power detection circuits.

The front panel 10-key pad and three of the softkeys of the *Set Max Reflected Power Menu* are active. The front panel 10-key pad is used to enter the desired maximum reflected power level.

The *Set Max Reflected Power Menu* softkey functions are:

[Softkey 1]—Cycles one step each time the softkey is pressed. The step sequence is:

OFF ALARM FAULT OFF etc.

These three states are:

OFF — Disables the reflected power detection circuit alarm and faults,

ALARM — Enables the minimum power detection circuit alarm. The display will show the Alarm and the buzzer will sound but High Voltage will NOT be shut off.

FAULT— Enables the minimum power fault detection circuit. The display will show Fault; the buzzer will sound and the High Voltage will shut off.

[Softkey 2]—Not Used. Numeric value shown on the line to the left of this softkey is the current minimum power level setting.

[Softkey 3]—Not Used. (Value you enter for the new value is displayed to the left of this key.)

Entries are in the units shown on the second line.

Press [Clear] to clear your entry. Press [Enter] to accept your entry.

[Softkey 4]—Pressed to return to the *Alarms/Faults Menu*.

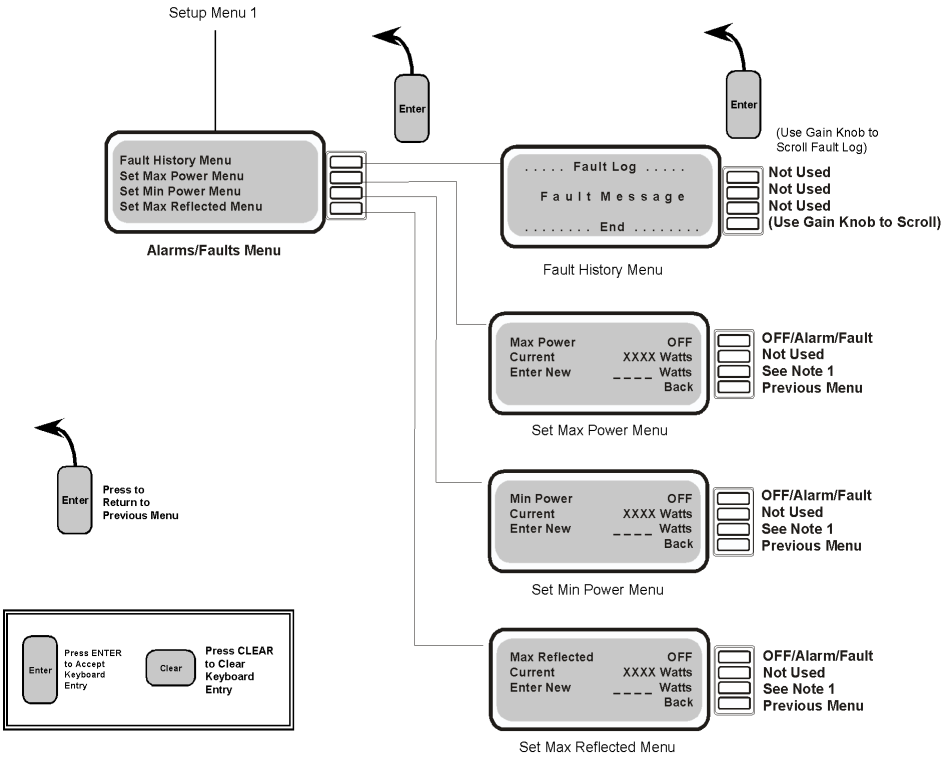
Figure 10, Alarms/Faults Setup Submenus

Test Menu

This menu allows you to test four amplifier functions. Refer to Figure 8 on page 20. All softkeys are active as follows:

[Softkey 1]—Pressed to test the front panel LEDs.

[Softkey 2]—Pressed to test the audio alarm



Note 1: Keyboard is enabled when this menu selected. Value entered here will be displayed until ENTER/CLEAR pressed. Accepted/Current value on second line.

[Softkey 3]—Pressed to test the summary fault circuit. The Summary Fault relays will switch; the Summary Fault LED will change state and high voltage will momentarily go off.

[Softkey 4]—Pressed to test the waveguide arc fault circuit. The fault line on the amplifier will change state. *(This is only applicable if W/G Arc detection installed)*

Note

Press [**Enter**] to move back one level in the setup menu system. Press [**Status1**] or [**Status2**] to exit the setup menu system.

Setup 2 Menu

Setup 2 Menu, Figure 11 provides access to these submenus:

Press **[Softkey 1]** to access the Constant Power Menu —This menu allows the amplifier to be configured for automatic control of the RF output power level.

Press **[Softkey 2]** to access the Offset factor Menu — This menu allows the user to adjust displayed output power up or down by a given amount (in dB).

[**Softkey 3**] allows you to turn RF Inhibit ON or OFF.

[Softkey 4] allows access to Setup Menu 3.

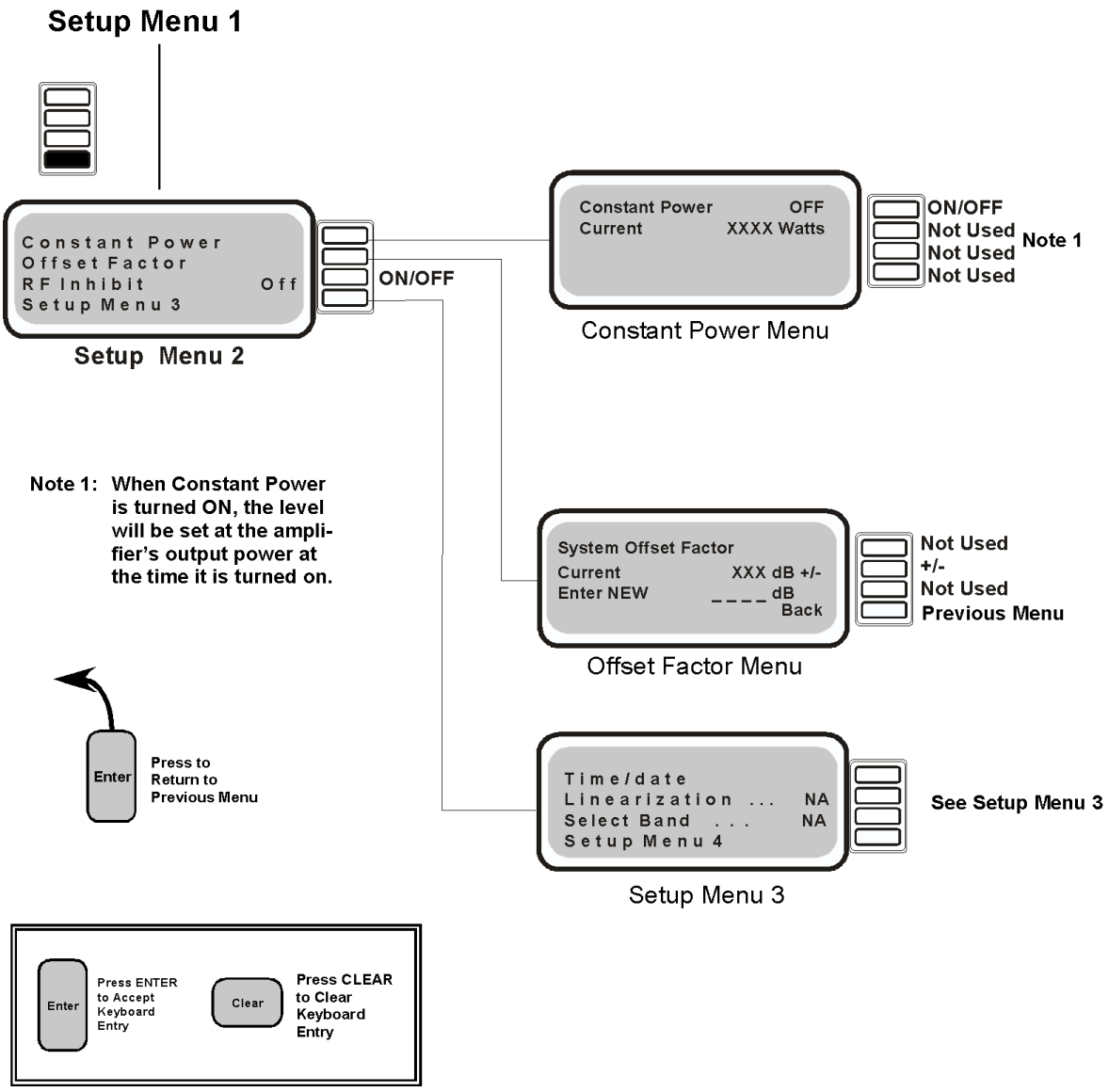


Figure 11, Setup Menu 2

Constant Power Sub-menu

The amplifiers can be setup to automatically maintain RF output power at a preset level. The front panel 10-key pad and one of the softkeys of this menu are active. The softkey functions are:

[Softkey 1]—Enables or disables the Constant Power function. Toggles between ON and OFF.

[Softkey 2]—Not Used. Value shown to the left of this key is the current setting. See Note 1 in Figure 11.

[Softkey 3]—Not Used.

[Softkey 4]—Not Used.

Offset Factor Menu

This menu allows offset of RF power output to compensate for waveguide losses and antenna gain. The front panel 10-key pad and three of the softkeys are active. The front panel 10-key pad is used to enter the desired adjustment (in dB).

The functions of the softkeys are:

[Softkey 1]—Not Used.

[Softkey 2]—Value shown to the left of this key is the current setting. Pressed to Changes polarity of the adjustment. Toggles between (+) and (-).

[Softkey 3]—Not Used. Value entered for the new value on the numeric keypad shows up to the left of the soft key. Press [**Enter**] to accept your entry. Press [**Clear**] to clear your entry.

[Softkey 4]—Go back to the previous menu.

Setup Menu 3

Setup Menu 3 allows you to:

- Set the time and date used for alarm and fault recording.
- Select linearizer, if installed, and adjust phase and amplitude.
- Select band.

Setup Menu 3, Figure 12 provides access to the Time/Date Menu, the Linearization Menu, the Calibrate Attenuator Menu, and Setup Menu 4.

[Softkey 1]—Press to access the *Time/Date Menu*

[Softkey 2]—If Linearizer is installed, press to access the *Linearization Menu*

[Softkey 3]—If HPA is multi-band, press to access the *Select band Menu*

[Softkey 4]—Press to access *Setup Menu 4*

Time/Date Menu

[Softkey 1]—Time value on line to the left of this soft key is the current time: hh:mm:ss. Press to allow entry of new time.

[Softkey 2]—Date value to the left of this softkey is the current date: yy/mm/dd. Press to allow entry of new date.

[Softkey 3]—Not used. Value entered for the new value on the numeric keypad shows up to the left of the soft key. Press [**Enter**] to accept your entry. Press [**Clear**] to clear your entry.

[Softkey 4]—Back. Return to *Setup Menu 3*

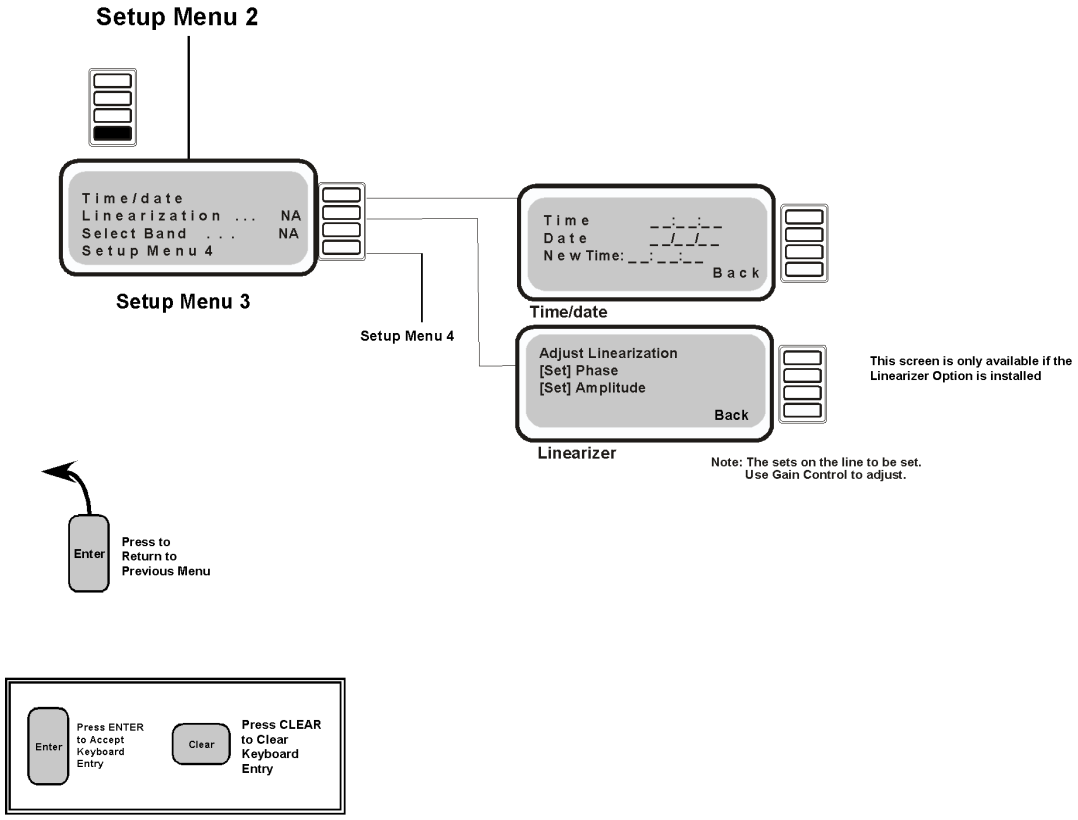


Figure 12, Setup Menu 3

Setup Menu 4

Setup Menu 4, Figure 13provides access to the Configure COM1, Configure COM2, Set System Address sub-menus, and Setup Menu 5 which is used to Calibrate Attenuator and Replace Firmware.

[Softkey 1]—Accesses the *Configure COM1 Menu.*

[Softkey 2]—Accesses the *Configure COM2 Menu.*

[Softkey 3]—Accesses the *Set System Address Menu.*

[Softkey 4]— Accesses *Setup Menu 5.*

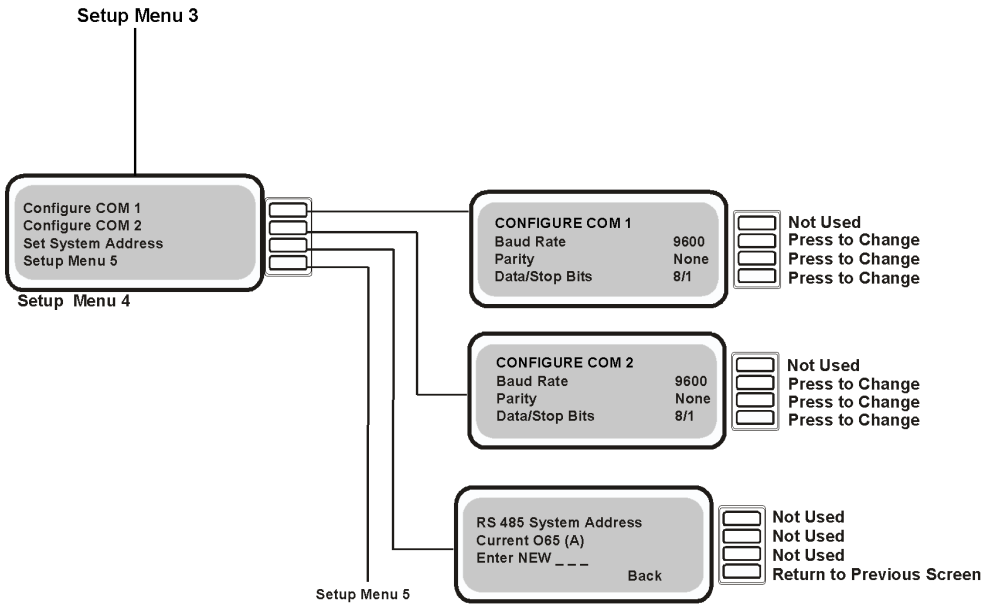


Figure 13, Setup Menu 4

Configure COM1 Menu

Three softkeys are active:

[Softkey 1]—Sets the serial port baud rate. Cycles one step each time the **[Softkey 1]** is pressed. The step sequence is:

1200 2400 4800 9600 19.2 38.4 57.6 1200, etc.

[Softkey 2]—Sets parity. Cycles one step each time [**Softkey 2**] key is pressed. The step sequence is:

None Even Odd None etc.

[Softkey 3]—Sets the data stop bits. Toggles between 8/1 and 7/2.

Press *Enter* to return to *Menu 4.*

Configure COM2 Menu

Three softkeys are active:

[Softkey 1]—Sets the serial port baud rate. Cycles one step each time the **[Softkey 1]** is pressed. The step sequence is:

1200 2400 4800 9600 19.2 38.4 57.6 1200, etc.

[Softkey 2]—Sets parity. Cycles one step each time [Softkey 2] key is pressed. The step sequence is:

None Even Odd None etc.

[Softkey 3]—Sets the data stop bits. Toggles between 8/1 and 7/2.

Press *Enter* to return to *Menu 4.*

Set System Address

One soft key is active. Refer to Figure 14.

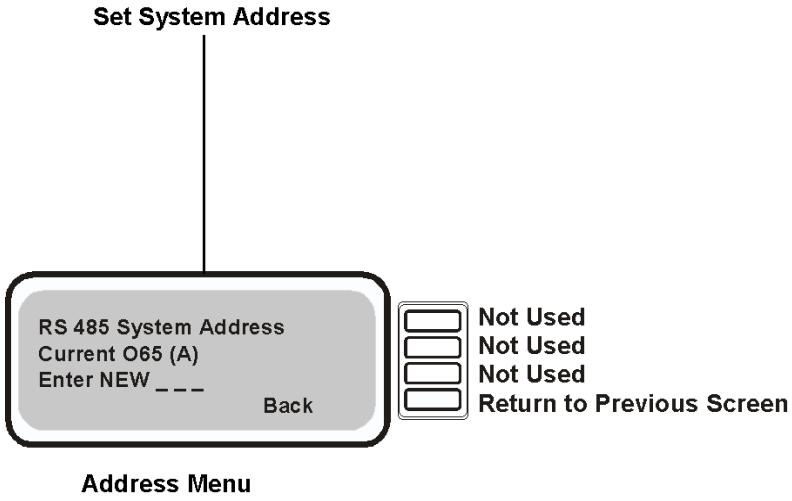
[Softkey 1]—Not used.

[Softkey 2]—Not used. Value to the left of this key shows current address.

[Softkey 3]—Not used. Value to the left of this key is the new address you enter using the numeric keypad. [**Enter**] accepts the value. [**Clear**] clears the line.

[Softkey 4]—Return to *Setup Menu 4.*

Figure 14, Address Menu



Setup Menu 5

Setup Menu 5, Figure 15 provides access to the Calibrate Attenuator and Replace Firmware submenus. This Setup Menu is to be used by Xicom Personnel only. It is shown here solely for information.

Figure 15, Setup Menu 5

Fault/Alarm Report Displays

The Alarm Report Displays work in the same way as the Fault Report Displays discussed in this section. When a fault occurs, the amplifier sounds an audible alarm (if enabled) and presents a “fault report” on the amplifier front panel display. Operator action is required to clear the fault report displays. There are two types of fault report displays:

- Latched Fault Report Displays
- Non-latched Fault Report Displays

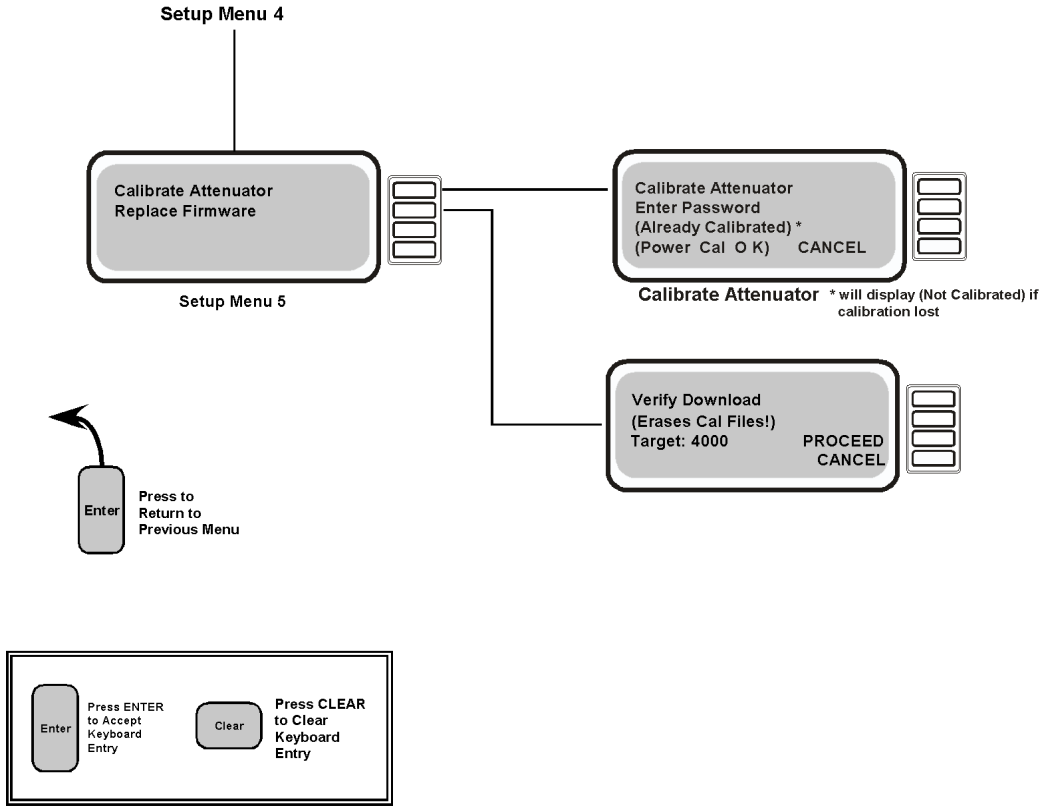


Table 4, TWTA Fault and Alarm List

Fault Log Abbr.	Display Name	Comments
F	fanlck	Fan Lock (Function Disabled)
F	ovrtmp	TWT Over Temp - Signal from temperature monitoring point on TWT
F	tubtmp	TWT Over Temp - Signal from secondary thermal switch built into the TWT
F	tubhot	TWT Over Temp in dual drawer units - Signal form the thermal switch built into the TWT
F	su\plhot	Power Supply overtemperature on dual drawer units - Signal from the temperature monitoring point in the power supply drawer
F	vswr	VSWR Reflected Power
F	hvundr	HV Under
F	hvover	HV Over
F	lowlne	Lowline
F	hamomt	Momentary Helix Arc
F	haltch	Helix Arc (Latched)
F	cvrint	Cover Interlock
F	extint	Local Interlock
F	wg arc	WaveGuide Arc
A	maxpwr	Max Power Alarm Software Alarm
A	minpwr	Min Power Alarm Software Alarm
A	maxrft	Max Reflected Alarm Software Alarm
F	maxpwr	Max Power Fault Software Fault
F	minpwr	Min Power Fault Software Fault
F	maxrft	Max Reflected Fault Software Alarm

F = Fault; turns high voltage off and turns the buzzer on
A = Alarm; turns buzzer on but does turn HV off.

Fault Report Displays--Latched Faults

The latched fault report displays are shown in Figure 16. Latched faults must be cleared by the operator. These fault report displays all operate in the same way. When the indicated fault occurs, the fault report display replaces the current menu and (if the audio alarm is enabled) the buzzer sounds.

Note

Latched fault circuits are always enabled and cannot be disabled by the operator.

The user has two options:

- Disable the buzzer continue in the faulted condition.
- Clear the fault by pressing Softkey 4 (Reset).

Both the fault latch and the fault report display will clear when Reset is pressed.

The fault will not reoccur if the fault condition was transient.

If the fault persists, (e.g. the high voltage overvoltage condition exists each time high voltage is turned) the fault circuit will trip again.

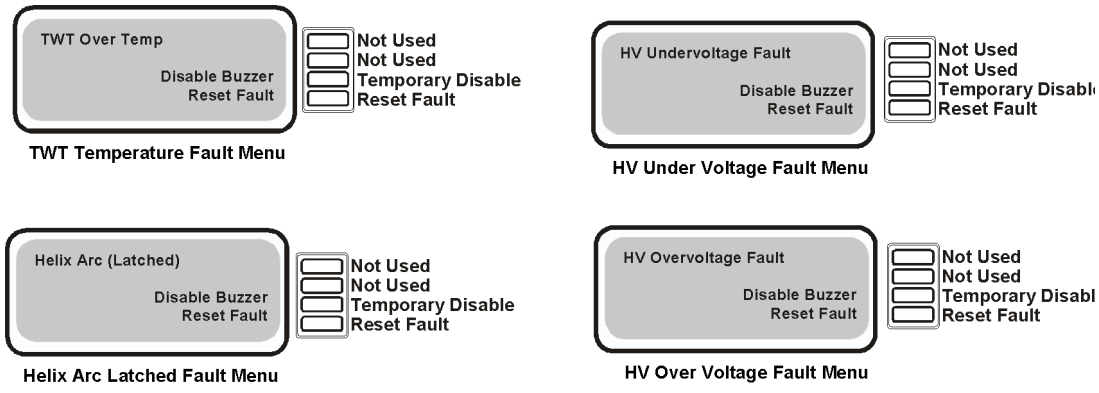


Figure 16, Latched Fault Report Displays

Non-latched Fault Report Displays

See Figure 17. Non-latched faults clear when the fault condition occurs. The non-latched fault report **does not** clear when the fault clears. Operator action is required to reset the fault report display. The operator clears a non-latched fault report display by returning to a previous menu. The operator can elect to:

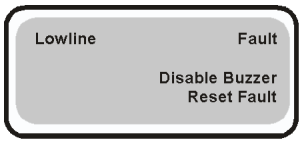
- For a persistent fault, go to a previous menu for the faulted function (e.g., set maximum power trip level), change the mode from fault to alarm and adjust the amplifier output to a new value.
- Respond to the fault report and correct the fault condition (e.g., correct prime power to alleviate a low-line condition).
- For a known cause such as a transient line-voltage dip, go to a previous menu to reset the fault report display, and then take no further action.

Three of the fault monitors (Maximum Power Fault, Minimum Power Fault, and Maximum Reflected Power Fault) are optional and can be enabled or disabled by the operator.

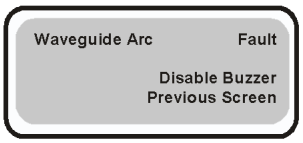
Figure 17, Non-Latched Fault Report Displays

Menutrees

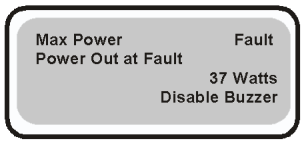
The menutrees for the XTRD Series Amplifier Digital M&C System are presented on individual pages so that you may remove and copy them for ready reference. See Figure 18 ", Menutree Sheet 1 of 3", Figure 19 , Menutree Sheet 2 of 3, and Figure 20 , Menutree, Sheet 3 of 3.



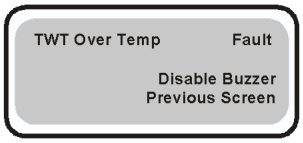
External Interlock Fault Menu



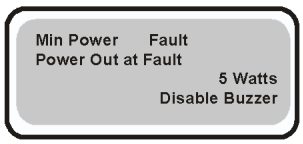
Waveguide Arc Fault Menu



Max Power Fault Menu

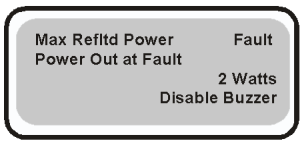


TWT Temperature Fault Menu

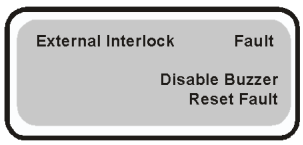


Min Power Fault Menu

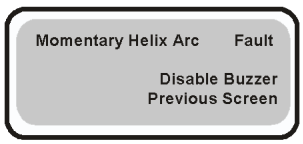
Fan Lock Fault Menu



Max Reflected Power Fault Menu



External Interlock Fault Menu



Momentary Helix Arc Fault Menu

Local Interlock Fault Menu

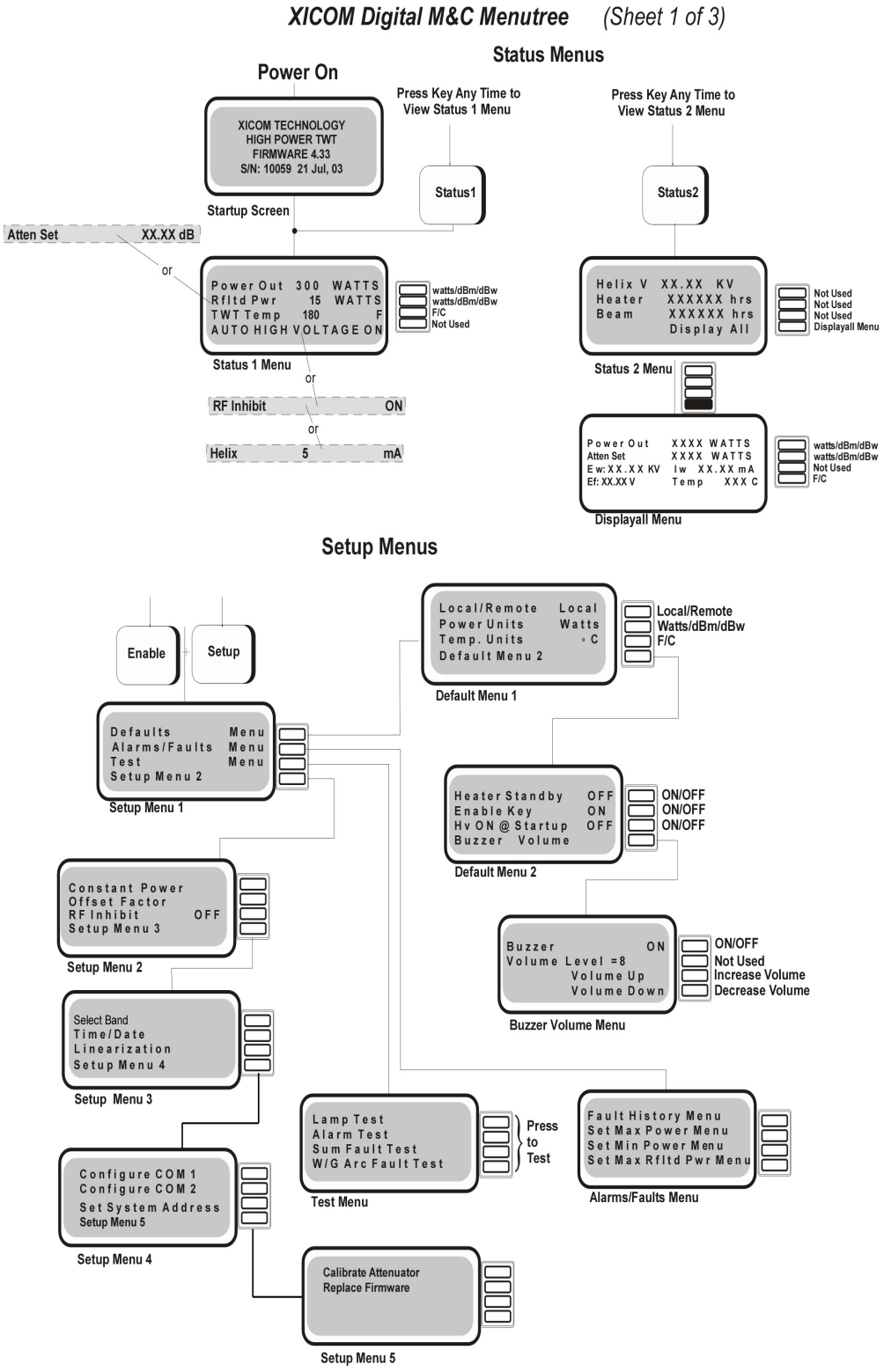


Figure 18, Menutree Sheet 1 of 3

XICOM Digital M&C Menutree *(Sheet 2 of 3)*

Setup System Sub-Menus

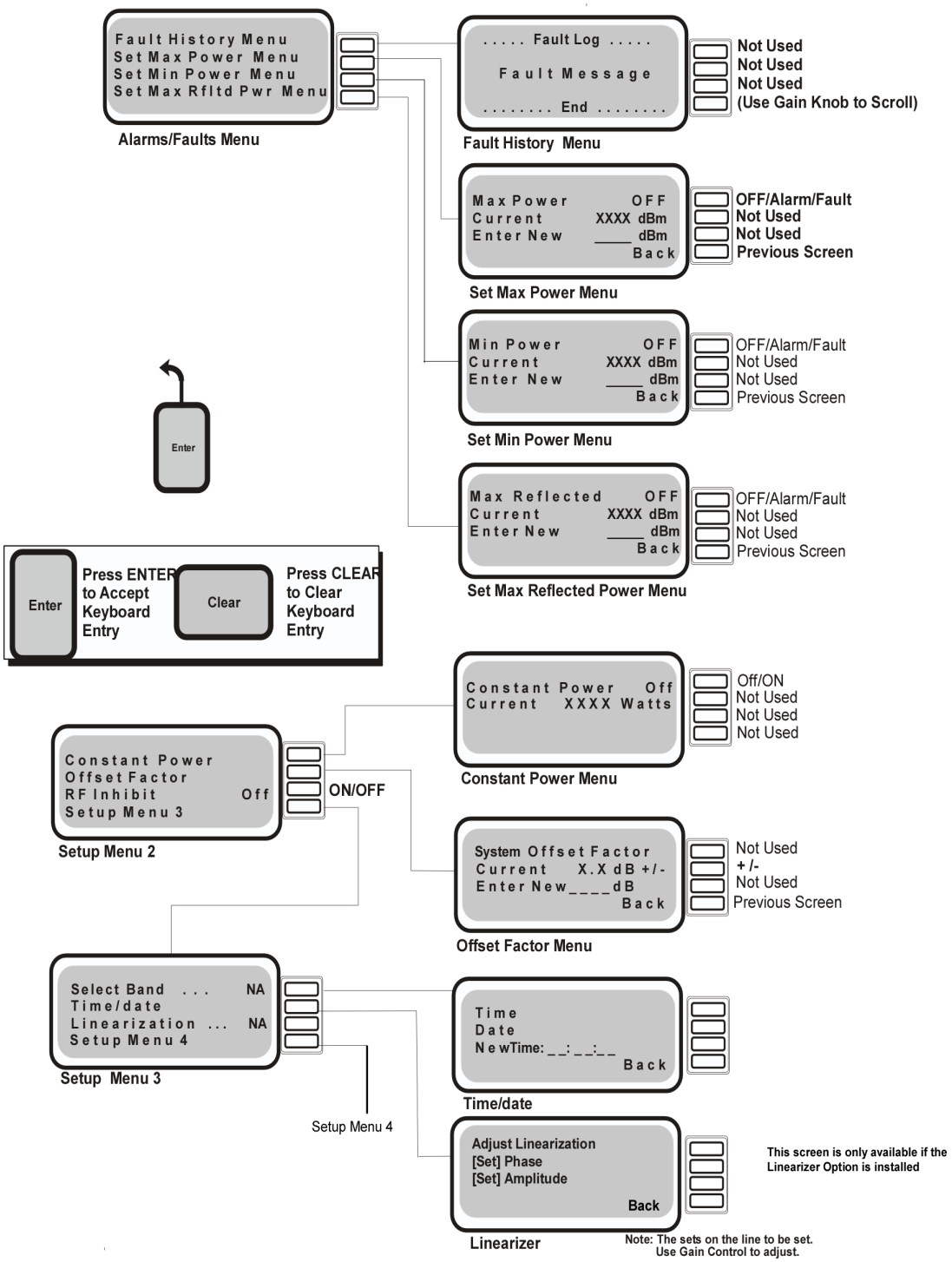


Figure 19, Menutree Sheet 2 of 3

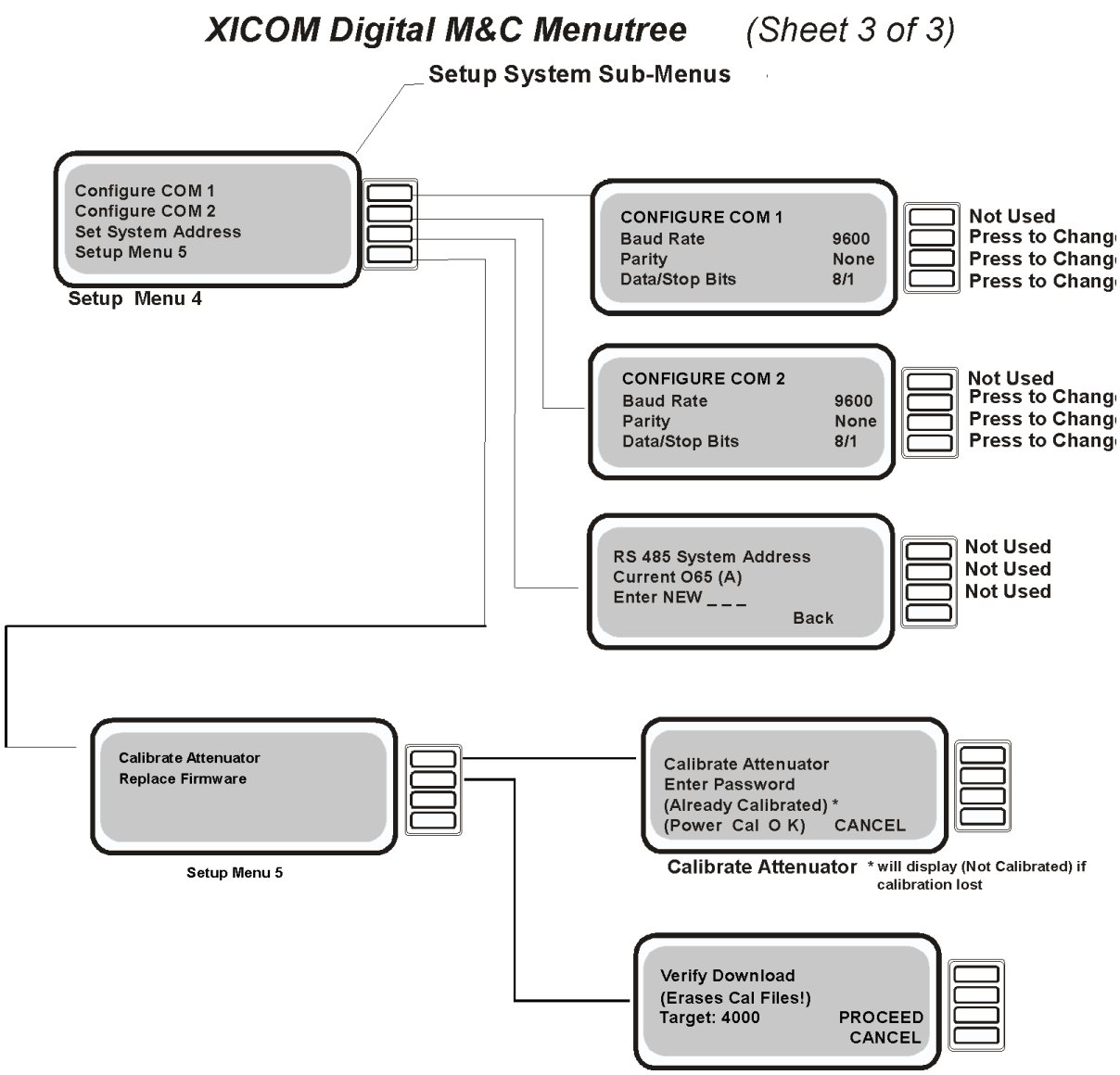


Figure 20, Menutree, Sheet 3 of 3

Initial Setup and Operation

General

The amplifier can be operated from the amplifier Front Panel (LOCAL configuration) or from a remote controller (REMOTE configuration). The amplifier is configured at the factory with the default values shown in Table 5. These values allow immediate operation of the amplifier when the amplifier is connected to an operational load or a dummy load capable of dissipating rated RF output power.

Table 5, Default Values

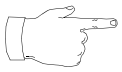
Parameter	Default Value
Gain	Minimum Gain
Local/Remote	LOCAL
RF Inhibit	OFF
System Offset	0.0 dB
Max Power Trip	OFF
Min Power Trip	OFF
Max Reflected Power	OFF
Audio Alarm	ON
COM1	9600 Baud, None, 8/1
COM2	9600 Baud, None, 8/1
Constant Power	OFF
Heater Standby	ON
HV ON at Startup	OFF
Enable Key	ON
Power Units	dBW
Temperature Scale	Centigrade

Note

It is recommended that operating time (standby and beam-on), operating conditions, power level, and maintenance actions be

recorded in a power amplifier log. Amplifier run-time records are maintained by the amplifier

Note

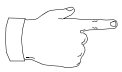


Refer to the chapter titled *Overview* for general amplifier specifications and the appendix *Specifications* for specifications that are specific to your particular amplifier.

Operating Configurations

There are two operating configurations: LOCAL and REMOTE. In LOCAL, all operations are controlled from the TWTA Front Panel. The controls and indicators were shown and summarized at the beginning of this chapter. In REMOTE the front panel high voltage and setup functions are inhibited.

Note



Familiarity with the XTRD menu system is required for LOCAL operation. Familiarity with the XICOM command set is required for REMOTE operation.

Operating Modes

The operating modes of the TWTA are described in the following sections. There are four amplifier operating modes:

- Filament Time Delay
- Standby
- Heater Standby
- Beam ON
- Fault

Filament Time Delay Mode (FTD)

When power is first applied to the amplifier, voltage is applied to the TWT's filament. The TWT's filament must be at its operating temperature for the tube to function properly. The typical warm-up period is three minutes. During this warm-up period, the FTD indicator (amber) will be illuminated. When the delay cycle is complete, the FTD indicator will be dark.

If there is a power failure, high voltage will be OFF for a period proportional to prime power off-time. At the end of the recovery period, if high voltage is ON when the prime power interruption occurs, high voltage is automatically restored

Standby Mode

In this mode, there are no faults and the TWT is ready for high voltage to be applied.

Heater Standby Mode

The purpose of heater standby is to extend the life to the tube when the high voltage is off.

The temperature of the cathode is the primary determinant of tube life. The emission of electrons from the surface of a cathode has a cooling effect on the cathode surface. Therefore, when high voltage is turned off the cathode surface temperature increases shortening the life of the tube. This is a special concern when the amplifier is in standby mode for extended periods of time; that is, when it is the standby unit.

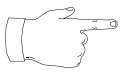
Heater Standby reduces the heater voltage when high voltage is off. The temperature of the cathode is reduced to a temperature slightly below the normal operating temperature. When high voltage is turned on, it overrides the heater standby command and returns the heater voltage to its normal setting. When the high voltage is turned off again the heater voltage is reduced.

When the amplifier has been online and then placed in the heater standby mode, there is no time delay when high voltage is turned on.

High Voltage ON Mode

When high voltage ON is selected, an internal relay is latched ON. This enables High Voltage ON.

Note



When the Beam On switch is turned ON high voltage will be applied to the TWT any time the FTD cycle is completed and there are no faults present. Interruption of prime power for any reason will force the power supply into the FTD Mode.

When high voltage is ON (applied to the TWT) RF input signals are amplified. If high voltage ON is selected before the Filament Time Delay cycle is complete, high voltage will remain OFF until the FTD cycle is complete.

Fault Mode

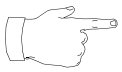
This mode exists anytime a condition detrimental to the TWT is detected by the power supply fault detection circuitry. Faults are indicated on the front panel by red LEDs. Any of the following conditions trip the fault detection circuitry:

Excessive Helix Current Fault—(Latched) When the power supply detects a Helix Current fault, it turns OFF high voltage and then tries to turn the high voltage ON. If the fault persists for three OFF/ON cycles, the fault circuit latches and the power supply stops automatically recycling.

Voltage Fault—A Voltage fault will latch immediately when a fault occurs. A Voltage Fault indicates a problem in activation of the high voltage system.

TWT Over-Temperature Fault—A TWT over-temperature fault will clear itself once the temperature of the TWT's collector is reduced to a safe operating level. High voltage will automatically be enabled when the overtemperature fault clears (if high voltage ON has been selected).

Note



An over-temperature fault should be cause for immediate maintenance action as it is an indication of a fan failure or blocked air passage(s).

WARNING

ELECTRIC SHOCK HAZARD because there is high voltage on various terminals inside the equipment. Turn OFF the equipment before removing lid. Failure to comply could result in serious injury or death to personnel.

WARNUNG

GEFAHR VON ELEKTRISCHEN SCHLÄGEN wegen Hochspannung auf verschiedenen Terminals innerhalb des Gerätes. Stellen Sie das Gerät AUS bevor Sie den Deckel abnehmen. Nichtbefolgen könnte die schwere Verletzung oder den Tod von Menschen zur Folge haben.

WARNING

ELECTRIC SHOCK HAZARD due to high voltage capacitors inside the equipment. Allow five minutes for the capacitors to completely discharge before removing lid and working in the equipment. Failure to comply could result in serious injury or death to personnel.

WARNUNG

GEFAHR VON ELEKTRISCHEN SCHLÄGEN wegen unter Hochspannung stehender Kondensatoren innerhalb des Gerätes. Lassen Sie den Kondensatoren fünf Minuten Zeit zur völligen Entladung, bevor Sie den Deckel abnehmen und im Gerät hantieren. Nichtbefolgen könnte die schwere Verletzung oder den Tod von Menschen zur Folge haben.

Clearing Alarms and Faults

See “Menu and Screen Descriptions” on page 13 for information about clearing the alarms and faults.

Initial Turn-On Procedure

This procedure applies the first time the unit is operated at your site and after any major repairs of the amplifier.

Caution

Operators and Service Personnel must observe the instructions in the following paragraphs. Failure to comply may cause permanent damage to the amplifier and void the warranty.

Vorsicht

Betreiber und Wartunspersonal müssen die Instruktionen in den folgenden Paragrafen beachten. Nichtbefolgen kann dauerhafte Schäden am Verstärker verursachen und die Garantie unwirksam machen.

Prepower Check

1 Prime power voltage is within the specified limits of the amplifier.

2. The RF output is terminated with a load capable of dissipating rated RF output power and the load has a maximum VSWR of 1.3:1.

3. The RF drive signal is within the frequency range of the amplifier and +5 dBm or less with the HPA set for minimum gain (control fully counterclockwise).

Caution

Operate the amplifier within the power limit specification. Exceeding the input power limit will cause a Helix Current Fault. Failure to comply may permanently damage the TWT.

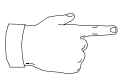
Vorsicht

Betreiben Sie den Verstärker im Rahmen der vorgegebenen Spannungsbegrenzung. Eine Überschreitung der Grenze für die Eingangsspannung verursacht einen Helix-Strom Fehler. Nichtbefolgen kann das TWT dauerhaft beschädigen.

Turn-On Sequence

1 Set the AC Power Switch ON.
2. Within two minutes after setting AC Power ON, press the ENABLE and HV OFF keys on the front panel of the amplifier at the same time. (This action assures that high voltage will be OFF when the Filament Time Delay Cycle is over.)
3. Press and hold the [**Enable**] key while rotating the **Gain** Control to minimum gain (fully counter-clockwise).
4. Connect a RF monitor to the output load assembly.
5. Connect a RF test generator or the operational RF drive to the RF Input on the Rear Panel.
6. With gain set to minimum value, set the RF drive source for a maximum output of +5 dBm.
7. Wait until the Filament Time Delay cycle is complete (approximately three minutes). When the Filament Time Delay cycle is complete, turn the RF drive off. The Standby indicator should light (green); the Htr Standby indicator should light (Amber) and the FTD indicator should go from amber to off.
8. Press the [**Enable**] key and the [**HV ON**] key at the same time. The high voltage ON indicator should light (green). This indicates that high voltage is ON and applied to the TWT.

Note



High voltage will not be enabled until the Filament Time Delay cycle is complete and all faults are cleared.

9. Turn on the RF drive signal.Slowly increase the RF drive to the TWT by rotating the Gain Control clockwise. Monitor the RF output power.

Caution

Do not exceed the dBm input power specification. Driving the TWT by more than 2 dBm beyond the input power required to reach the saturation point will over drive the tube. Failure to comply may cause permanent TWT damage.

Vorsicht

Überschreiten Sie nicht die vorgegebene dBm Eingangsspannung. Wird das TWT mit mehr als 2 dBm unter der für die Erreichung des Sättigungspunktes erforderlichen Eingangsspannung angesteuert, so wird die Röhre übersteuert. Nichtbefolgen kann das TWT dauerhaft beschädigen.

10. Press the [**Enable**] and [**HV OFF**] keys at the same time. This turns high voltage OFF. The Standby and Htr Standby Indicators are on (amber).

The TWTA is ready for operational service.

Normal Turn-On

The following procedure assumes that the Initial Turn-on procedure was successfully completed, the AC Power Switch has been set to OFF (**O**), and the TWTA is properly connected to the operational system.

1 Set the **AC Power switch** (Rear Panel) to ON (**|**). The AC Power indicator should light (green) and the FTD indicator should light (amber).

2. Wait until the Filament Time Delay cycle is complete (approximately three minutes). When the Filament Time Delay cycle is complete, the Standby indicator should light (green) and the FTD indicator should go dark.

3. Press the [**Enable**] key and the [**HV ON**] key at the same time. The high voltage ON indicator should light (green). This indicates that high voltage is ON and applied to the TWT. The Standby and Htr Standby Indicators should turn OFF.
4. Select Local or Remote operation.

The TWTA is on-line.

Normal Turn-Off

When the amplifier is going to be off for an extended period turn the High Voltage OFF. Then set the AC Power Switch to OFF (**O**). This will extend the life of the TWT. For short periods of off time (one hour or less), it is best to switch to the HV OFF (in Heater Standby mode.)

Amplifier Communication and Protocol, Octagon ISA CPU

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Format changes	08/2001	A.L. Crozier, Jr.
3		Format change—Table of Contents, List of Figures, List of Tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/12/2001	A.L. Crozier, Jr.
B	9768	Update Summary Status and Screen Function	05/01/2002	A.L. Crozier, Jr.
C	9852	Update to reflect Octagon ISO CPU only	05/22/2002	A.L. Crozier, Jr.
D	10380	Editorial Updates	10/28/2002	A.L. Crozier, Jr.
E	11069	Add undetectable RF responses	06/05/2003	A.L. Crozier, Jr.
F	12070	Add Reject and ASCII Codes	04/08/2004	A.L. Crozier, Jr.
G	12722	Add command PCx to Miscellaneous Setup	12/13/2004	A.L. Crozier, Jr.
H	13600	Correct Advanced Query Response 2; Command Byte ‘L’; Command Byte ‘M’; Command Byte ‘%’	11/15/2005	A. Auld

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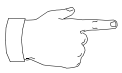
Amplifier Communication and Protocol, Octagon ISA CPU

Overview

Refer to Figure 1 for basic configuration.

Note



In this chapter, the term **analog** refers to devices without a serial interface. The term **digital** refers to devices with a serial interface (RS-232/RS-485).

Xicom amplifiers typically respond to a message in less than 100 milliseconds.

Communication

Digital HPAs

Both rack-mounted and outdoor digital HPAs have a built-in microprocessor for handling serial communications. With the exception of the Prime Power Switch, all operation of digital HPAs can be completely controlled via the serial interface (RS-232/RS-485).

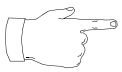
Analog HPAs

With a Xicom digital controller, analog HPAs can be completely controlled using a serial interface. Although Xicom's analog HPAs can also be controlled via an analog controller, a digital controller is needed to emulate the serial protocol of a digital amplifier.

Compatibility

Two serial hardware interfaces (RS-232, RS-422/485) are available for the control link.

Note



Amplifiers without an attenuator will reject attenuator commands, commands that attempt to adjust output power, and RF Inhibit Commands.

Amplifiers without the power monitor option will respond to queries for power readings, but the value returned should be ignored because output power is not being measured.

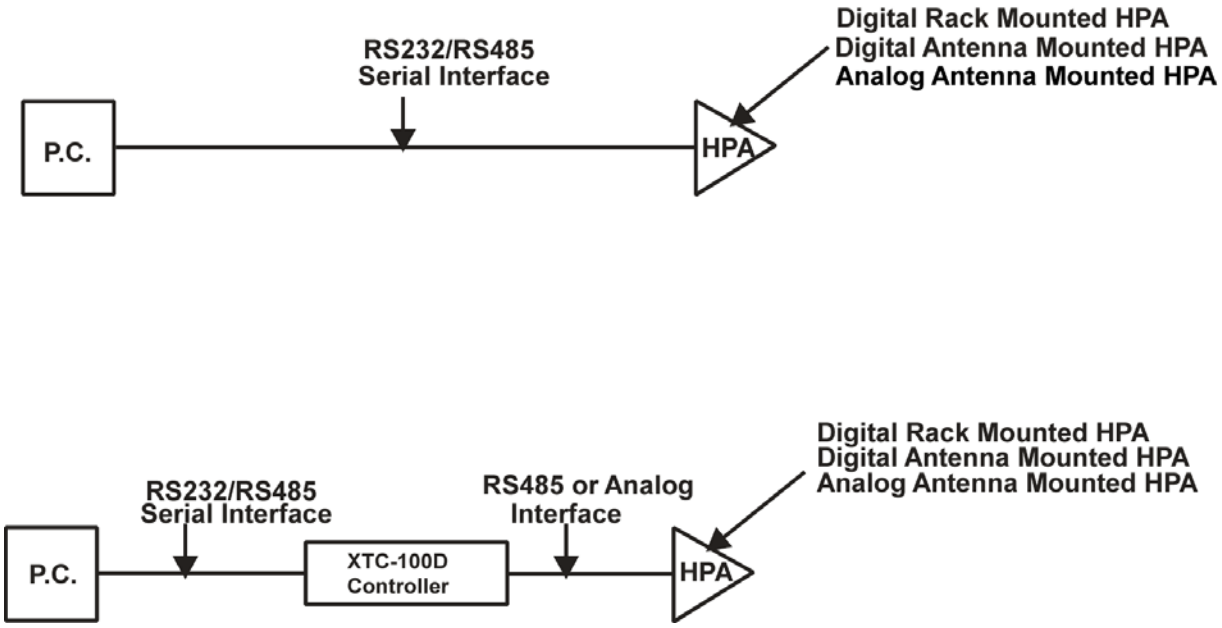


Figure 1, Basic Configuration

Protocol

Overview

Xicom digitally controlled devices monitor their serial ports for incoming messages and respond to messages as soon as they are verified. Response time varies, typically ranging between 20 and 100 milliseconds. Although devices will respond to messages with invalid parameters, they ignore messages with invalid address bytes or check bytes.

Message Format

- Commands, Queries, and Responses are formatted according to Table 1 and Table 2 on page 9
- Messages are delineated using start and stop characters, followed by a check byte.
- The address byte allows a master device to selectively communicate with individual devices that are sharing a RS-485 bus.
- Each message has a mandatory message byte, followed by a variable number of parameters. Some messages have no parameters, while others can have many. The variable length parameter field is also used to hold message responses.

RS-485

Using RS-485, a master device can maintain status and control of multiple devices, which share send/receive lines. Slaves may transmit only in response to a command or query from the master. Each device is assigned a unique address between 'A' and 'Z' to differentiate it from other devices.

RS-485 device addresses are selected on rack HPAs using the front panel interface. They are selected on digital outdoor HPAs using Xicom's "wRemote" utility.

Note

If a device is not responding to your messages, check the RS-485 device address.

Printable vs. Non-Printable Protocols

Printable protocol facilitates teletype-style operations where users type in messages and view the responses. There are two drawbacks to this method:

1) Several responses contain bit flags (example: HPA Summary Status Query). To force the resulting byte to be printable, bit 6 is conditionally set. However, there is no guarantee that the resulting byte will not be a start or stop character.
2) There is no provision for Xicom responses to directly indicate the success or failure of a given message. Rather, the length of the response can be checked to determine the presence or absence of a message-rejected code.

Printable protocol drawbacks are remedied by the non-printable protocol. Because start and stop bytes are non-printable, they cannot be confused with message parameters, which are always printable. Also, different start bytes are used to indicate whether a message was accepted or rejected. For nearly all implementations, the non-printable protocol should be used.

If you send a message using the printable protocol, devices will respond using the printable protocol. If you send a message using non-printable protocol, devices will respond using the non-printable protocol. There are no DIP switches to set, and there is no software to configure. Xicom devices always respond in kind:

- Printable and non-printable protocols differ only in the characters used for start, stop, and check bytes. Refer to Table 3.
- The "printable" protocol uses printable start and stop characters; check bytes are generated using a method that produces printable ASCII characters.
- The "non-printable" protocol uses non-printable start and stop bytes; its check byte algorithm can yield non-printable characters. Refer to Table 4 and examples on page 11.

Communication Parameters

Communications can be configured as follows:

Baud rates: 1200, 2400, 4800, 9600, 19,200, 38,400, and 57600
Parity:None, Even, or Odd
Data bits:7 or 8
Stop bits:1 or 2

Flow control options should be set to "none."

- HPAs support 8/1 or 7/2, but not 8/2, etc.
- The default communication parameters are 9600 baud, N/8/1, unless otherwise requested.
- Parameters are selected on rack HPAs using the front panel interface.
- Parameters are selected on digital outdoor HPAs using a remote interface.

Table 1, Standard Packet Format

Start Byte	Address Byte	Message Byte	Parameter as Required	End Byte	Check Byte

Table 2, Packet Format (Redundant Controller—XTC-100 Family

Start Byte	Address Byte	Device Selection Byte	Message Byte	Parameters as Required	End Byte	Check Byte

Table 3, Start Byte, End Byte, & Check Byte

Protocol	Packet Type	Accept/ Reject	Start Byte	End Byte	Check Byte
Printable	Message		(ASCII){	(ASCII)}	"Base 95"
	Response	Message Accepted or Rejected	{	}	
Non-Printable	Message		STX	ETX	"Exclusive OR"
	Response	Message Accepted	ACK	ETX	
		Message Rejected	NAK	ETX	

Table 4, Check Byte Calculation

"Base 95"	1. Take [Sum (all message bytes)] – 32 = C 2. Then take [Modulus C ("Base 95")] + 32 = Result (Printable ASCII character in range of 32 to 126)
"Exclusive OR"	XOR (all message bytes) = Result (non-printable byte)

Example of "Base 95"

Message ("ID/Version" Query): {AO}

1 Take Sum of Message Bytes

'{' + 'A' + 'O' + '}'

123 + 65 + 48 + 125 = 361

2. Subtract 32

361 – 32 = 329

3. Modulus 95

329% 95 = 44

4. Add 32

44 + 32 = 76 (ASCII 'L')

Example of "Exclusive OR" Algorithm

Message ("ID/Version" Query): STX A 0 ETX (ASCII)

Progressively XORs the bytes to establish the check byte

Check byte = STX ^ A ^ 0 ^ ETX = ASCII character (may be non-printable)

thus:

STX	0000 0010	> XOR
A	0100 0001	
Result 1	0100 0011	> XOR
0	0011 0000	
Result 2	0111 0011	> XOR
ETX	0000 0011	
Check Byte	0111 0000 =	70h ⟶ "p"

Reject and ASCII Codes

Table 5 is a list of Reject Codes that are returned when an illegal or unsupported command is sent. Table 6 is a cross reference list of the ASCII Codes that are used in generating the commands and queries of the protocol.

Table 5, Command Reject Codes

ASCII Character	Reject Reason
a	Command byte not recognized
b	Illegal parameter or parameter out of range
c	System in local mode
d	Slow command being executed
e	Hardware or Software failure
f	High voltage is OFF
g	RF is inhibited
h	HPA Power is OFF
i	Invalid key or key sequence
j	Change in setting can only be made locally
k	A fault condition exists
l	System in Automatic Mode
m-z	Reserved

Table 6, ASCII Code Cross Reference

CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX
NUL	000	00	+	043	2B	V	086	56
SOH	001	01	,	044	2C	W	087	57
STX	002	02	-	045	2D	X	088	58
ETX	003	03	.	046	2E	Y	089	59
EOT	004	04	/	047	2F	Z	090	5A
ENQ	005	05	0	048	30	[	091	5B
ACK	006	06	1	049	31	\	092	5C
BEL	007	07	2	050	32	]	093	5D
BS	008	08	3	051	33	^	094	5E
HT	009	09	4	052	34		095	5F
LF	010	0A	5	053	35	‘	096	60
VT	011	0B	6	054	36	a	097	61
FF	012	0C	7	055	37	b	098	62
CR	013	0D	8	056	38	c	099	63
SO	014	0E	9	057	39	d	100	64
SI	015	0F	:	058	3A	e	101	65
DLE	016	10	;	059	3B	f	102	66
DC1	017	11	<	060	3C	g	103	67
DC2	018	12	=	061	3D	h	104	68
DC3	019	13	>	062	3E	i	105	69
DC4	020	14	?	063	3F	j	106	6A
NAK	021	15	@	064	40	k	107	6B
SYN	022	16	A	065	41	l	108	6C
ETB	023	17	B	066	42	m	109	6D
CAN	024	18	C	067	43	n	110	6E
EM	025	19	D	068	44	o	111	6F
SUB	026	1A	E	069	45	p	112	70
ESC	027	1B	F	070	46	q	113	71
FS	028	1C	G	071	47	r	114	72
GS	029	1D	H	072	48	s	115	73
RS	030	1E	I	073	49	t	116	74
US	031	1F	J	074	4A	u	117	75

Table 6, ASCII Code Cross Reference

CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX
SPACE	032	20	K	075	4B	v	118	76
!	033	21	L	076	4C	w	119	77
“	034	22	M	077	4D	x	120	78
#	035	23	N	078	4E	y	121	79
$	036	24	O	079	4F	z	122	7A
%	037	25	P	080	50	{	123	7B
&	038	26	Q	081	51	|	124	7C
‘	039	27	R	082	52	}	125	7D
(	040	28	S	083	53	~	126	7E
)	041	29	T	084	54	DEL	127	7F
*	042	2A	U	085	55			

Commands and Queries

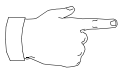
Firmware Information

The following firmware revision is baseline:

TWT Amplifier (all models)3.81

All commands and queries listed herein are compatible with baseline firmware except where noted.

Note



Certain commands and queries require that special options be present in your unit(s). For example, an amplifier without an attenuator will reject command 'C': "Set Attenuator." In the Commands and Queries in this section, compatibility issues are noted when relevant.

Table 7 provides the operators and technicians a list of the amplifier queries and pages available for use.

Table 8 provides the operators and technicians a list of the amplifier commands and pages available for use.

Table 7, List of Amplifier Queries

Table 8, List of Amplifier Commands

Amplifier Queries

ID/Version
Command Byte: '0' **Response**: "MMMMMMMVRR" MMMMMMM is the amplifier model number. V is the firmware version number. RR is the firmware revision level. **Optional Parameter:** “00” Returns the following: **Response**: "MMMM-MMM/SSSSS/V.RR" MMMM-MMM is the amplifier model number. SSSSS is the amplifier serial number. V is the firmware version number. RR is the firmware revision level.

Summary Status	
Command Byte: '1' **Response**: "AB" formatted as follows:	
Byte 'A' Bit 7: Reserved Bit 6: Complement of Bit 5 Bit 5: Power Supply Enabled Bit 4: High Voltage On Bit 3: Standby Bit 2: Remote Mode Bit 1: Constant Power On Bit 0: RF Inhibited	Byte 'B' Bit 7: Reserved Bit 6: Complement of Bit 5 Bit 5: Summary Fault Bit 4: Heater Standby Bit 3: Output Power changed 0.2 dB since last Power Out query Bit 2: Alarm Exists Bit 1: High Voltage Level Reduced (If using a XTC-100D which is configured for analog ODUs , this bit means: AMP Not Connected) Bit 0: Auto HV ON (HV selected, but HV not ON)
Notes: Power Supply Enabled is only defined for amplifiers connected to a controller. If you query an amplifier through a controller, the controller generates the summary status response on behalf of the amplifier. Thus it can indicate Power Supply Enabled status. Amplifiers cannot respond to queries if power is off. If High Voltage On and Standby are both zero, the amplifier is in "Filament Time Delay." Outdoor Units are always in Remote Mode unless they are configured with a Local Override switch. RF can be inhibited through the user front panel or by serial command. The High Voltage Level is Reduced/Restored via command 'N'. This bit is defined for Tri-Band amplifiers with the Voltage Shift Option.	

Fault Status
Command Byte: '3' **Response**: "AB" formatted as follows: Byte 'A' Bit 7: Reserved. Bit 6: Complement of bit 5. Bit 5: Latched Helix Arc Fault. Bit 4: Momentary Helix Arc Fault. Bit 3: Over Temp Fault. Bit 2: Over Voltage Fault. Bit 1: Fan Locked. Bit 0: Low Line. Byte 'B' Bit 7: Reserved. Bit 6: Complement of bit 5. Bit 5: Under Voltage Fault. Bit 4: High Reflected Power. Bit 3: External Interlock open. Bit 2: Low Output Power. Bit 1: High Output Power. Bit 0: Waveguide Arc Fault. (If configured with waveguide arc detector) **Notes**: Low Output Power, High Output Power and High Reflected Power are user-defined faults. A High Reflected Power fault can also occur when the VSWR detection circuit trips.

Fault History
Command Byte: '4' **Response**: A list of the last 100 faults. Each fault string has the following format: "AAAAAAAA YYMMDD HHMM!" The first eight bytes describe the fault, and the remaining bytes serve as a time-stamp. Each string is terminated by '!'; the last string in the sequence is followed by an additional '!'. **Compatibility**: Not available when querying amplifiers through controllers.

Current Screen
Command Byte: '5' **Response**: Returns the amplifier's current screen. Xicom's digital rack HPA has a Vacuum Fluorescent display with four lines of twenty characters each. The response is four 20 character strings, each terminated by '!' for a total of 84 characters. Xicom's digital outdoor controller has a Vacuum Fluorescent display with one line twenty characters wide. Since it emulates the HPA command set, it will respond to this query, but it only returns a single 20 character string. Xicom's digital ODU has no display it internally maintains the same menu system as Xicom's digital rack HPA. A digital ODU returns four 20 character strings, each terminated by '!'. **Compatibility**: Not available when querying analog amplifiers via a controller.

Power in dBW
Command Byte: '6' **Response**: "XX.X" dBW. This is the HPA output power in dBW, as adjusted by the offset factor (entered through the HPA front panel interface for digital HPAs or adjusted via Controller Command ‘F’, Adjust RF Calibration.) When HV is OFF or RF is not detectable the response is “<-X”.

Power in Watts
Command Byte: '7' **Response**: "XXXX" Watts. This is the HPA output power in Watts, as adjusted by the offset factor (entered through the HPA front panel interface for digital HPAs or adjusted via Controller Command ‘F’, Adjust RF Calibration.) When HV is OFF or RF is not detectable the response is “<X.X”.

Attenuator Counts
Command Byte: '8' **Response**: "XXXX" counts, ranging from 0 to 4095. This is the value written to the D-to-A converter which controls the attenuator. For estimated attenuation in dB, use the *Advanced Query* with parameter 'A'. **Compatibility**: Attenuator required. Not available when querying analog HPAs via a controller.

Alarm Condition
Command Byte: '9' **Response**: One byte of alarm status, formatted as follows. Bit 7: Reserved. Bit 6: Complement of bit 5. Bit 5: High Output Power. Bit 4: Low Output Power. Bit 3: High Reflected Power (VSWR). Bit 2: Reserved. Bit 1: Reserved. Bit 0: Reserved. **Notes**: Low Output Power, High Output Power and High Reflected Power are user-defined alarms. **Compatibility**: Not available when querying analog amplifiers via a controller.

Advanced Query

Command Byte: '?'

Description:

The Advanced Query feature, which is included in firmware versions 3.56 and higher, is intended to streamline the user's polling loop by allowing the user to construct custom query sequences. It is a complete polling solution returning virtually any measurement you might want.

Measurements are requested using a variable length parameter list. The length of the response will vary according to the measurements selected. Measurements are returned in the order specified by the user.

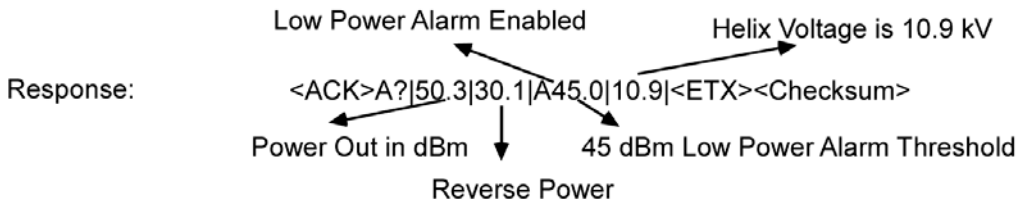
The syntax of an Advanced Query command is as follows:

<start character><address><'?'><parameter 1><parameter 2>…<parameter last><end character><check character>

Note: Separators (|) are shown to clarify the response. They are not part of the response.

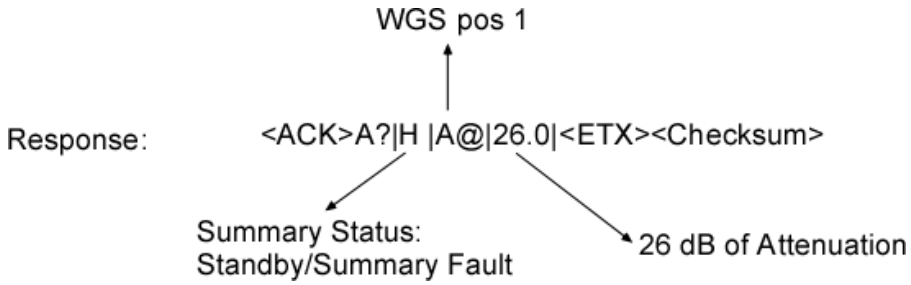
Example 1

Query: <STX>A?PQLV<ETX><checksum>



Example 2

Query: <STX>A?13A<ETX><checksum>



Parameter	Information Requested	Response Format
'!'	Extended Summary Status	4 bytes Byte A Summary Status Byte A Byte B Summary Status Byte B Byte C Bit 7 — not used (always 0) Bit 6 — compliment of Bit 5 Bit 5 — not defined Bit 4 — not defined Bit 3 — not defined Bit 2 — automatic mode Bit 1 — Waveguide Switch Position '0' ("other" amplifier) Bit 0 — Waveguide Switch Position '1' ("this" amplifier) Byte D Future Use
'1'	Summary Status	XX
'3'	Fault Status	XX
'6'	Power	XX.X in dBW HV OFF or RF not detectable "<-X"
'7'	Power	XXXX in Watts HV OFF or RF not detectable "<X.X"
'8'	Attenuator Setting	XXXX counts
'9'	Alarm Status	X
'A'	Attenuator	XX.X in dB
'H'	High Power Alarm/Fault Trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'h'	High Power Alarm/Fault Trip point and setting	A XXXX in Watts (generate alarm) F XXXX in Watts (generate fault) D XXXX in Watts (disabled)
'I'	Helix Current	XX.X in mA
'L'	Low Power Alarm/Fault Trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'l'	Low Power Alarm/Fault Trip point and setting	A XXXX in Watts (generate alarm) F XXXX in Watts (generate fault) D XXXX in Watts (disabled)
'M'	Heater Hours	XXXXXX hours
'N'	Beam Hours	XXXXXX hours
'0'	RF System Offset	XX.X in dBm

'P'	Fwd Power	XX.X in dBm HV OFF or RF not detectable "<XX"
'Q'	Reverse Power	XX.X in dBm HV OFF or RF not detectable "<XX"
'R'	Reverse Power Alarm/Fault trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'r'	Reverse Power Alarm/Fault Trip point and setting	XXXX in Watts
'T'	TWT Temp	XXXX in ^{O}Celsius (Right Justified and Padded with Spaces.)
'V'	Helix Voltage	XX.X in KV
'Z'	Linearizer Amplitude	$0 \rightarrow 4095$ counts conversion equation is V=Z*(10/4096)
'z'	Linearizer Phase	$0 \rightarrow 4095$ counts conversion equation is V=z*(10/4096)
Compatibility: The XTC-100D supports the following parameter subset (when querying it for amplifier status): '1', '3', '8', 'I', 'M', 'N', 'P', 'Q', 'T', and 'V'. Note that Parameters 'M' and "N" are only available for digital HPAs. Redundant Controllers turn around '1', '8', 'I', 'P', 'Q', 'T', 'V'. Dual Path Controllers pass through queries regardless of parameters. Parameters 'Z' and 'z' are only available with HPAs that have the linearizer option.		

Get Serial Configuration
Command Byte: 'X' **Parameters**: '?' returns the configuration of the communications port that the query was received on. "1?" returns information on COM1. "2?" returns information on COM2. "R?" returns RS-485 Configuration. **Response for '?', '1?', and '2?'**: "CBBBBBBPDS" C Communications port; 1=COM1, 2=COM2. BBBBBB Current baud rate. Example: 019200. P Parity, 'N', 'O', or 'E'. D Data bits, '8' or '7'. S Stop bits, '1' or '2'. **Response for 'R?'**: "ABC" A A is 4 or 2 Wire B B is T (Terminated) or U (Unterminated) C C is RS 485 address **Compatibility**: Not available when talking to an amplifier via a Digital Outdoor Controller. **Notes**: See also the *Set Serial Configuration* command.

Amplifier Commands

AC Power
Command Byte: '!' **Function**: Enables/Disables AC power to the HPA. **Parameters**: '0' - Disable AC power. '1' - Enable AC power. **Compatibility**: This command is only available for ODUs connected to a controller. The controller will intercept the command and enable or disable power to the specified amplifier.

Heater Standby
Command Byte: ':' **Function**: Enables/Disables Heater Standby mode. **Parameters**: '0' - Disable Heater Standby. '1' - Enable Heater Standby.

High Voltage On
Command Byte: '@' **Function**: Turns high voltage on. If the unit is in Filament Time Delay, high voltage will automatically turn on when Filament Time Delay ends.

High Voltage Off
Command Byte: 'A' **Function**: Turns off high voltage. If the unit is in Filament Time Delay, this command ensures that high voltage will not turn on when Filament Time Delay ends.

Fault Reset
Command Byte: 'B' **Function**: Resets any of the HPA's resetable faults.

Step Attenuator
Command Byte: 'C' **Function**: Steps attenuator count up or down. The attenuator count is written to the D-to-A converter that controls the attenuation. When this command is executed, the change in attenuation is virtually instantaneous, permitting radical adjustments to output power. Note that when high voltage is on, drastic attenuator changes may affect the life of the TWT. A recommended alternative is to use a *Go To Power* command ('D' or 'E'). **Parameter**: "+XXXX" steps. This is an integer preceded by '+' or '-'. This offset is applied to the current attenuator count which ranges from 0 to 4095. **Note:** If direct attenuation control is required, most users will prefer command Set Attenuator: ('K'), which specifies attenuation in dB. **Compatibility**: Attenuator required.

Go To Power (dBW)
Command Byte: 'D' **Function**: The HPA seeks the specified power level for 10 seconds. **Parameter**: The desired power level in "XX.X" dBW. **Compatibility**: Attenuator required.

Go To Power (Watts)
Command Byte: 'E' **Function**: The HPA seeks the specified power level for 10 seconds. **Parameter**: The desired power level in "XXXX" Watts. **Compatibility**: Attenuator required.

Constant Power (dBW)
Command Byte: 'F' **Function**: The HPA seeks the specified power level until Constant Power is terminated by *Goto Power* (Command Byte 'D' or 'E') or *Terminate Constant Power* (Command Byte 'H'). Also called "Auto Gain Stabilization," the Constant Power (dBW) command allows the user to operate an amplifier over extended periods of time while maintaining a set power level. Constant Power Mode is intended to compensate for gain drift (due to time or temperature). **Parameter**: The desired power level in "XX.X" dBW. **Compatibility**: Attenuator required.

Constant Power (Watts)
Command Byte: 'G' **Function**: The HPA seeks the specified power level until Constant Power is terminated by *Goto Power* (Command Byte 'D' or 'E') or *Terminate Constant Power* (Command Byte 'H'). Also called "Auto Gain Stabilization," the Constant Power (Watts) command allows the user to operate an amplifier over extended periods of time while maintaining a set power level. Constant Power Mode is intended to compensate for gain drift (due to time or temperature). **Parameter**: The desired power level in "XXXX" Watts. **Compatibility**: Attenuator required.

Terminate Constant Power
Command Byte: 'H' **Function**: If active, Constant Power Mode is terminated. **Compatibility**: Attenuator required.

RF Inhibit
Command Byte: 'I' **Function**: Inhibits RF drive to the TWT. **Compatibility**: Attenuator required.

Clear RF Inhibit
Command Byte: 'J' **Function**: RF drive to the TWT is enabled. **Compatibility**: Attenuator required.

Set Attenuator
Command Byte: 'K' **Parameter:** "XX.X" dB of attenuation OR "IX.X" to increase attenuation by X.X OR "DX.X" to decrease attenuation by X.X **Function**: Instantly sets the attenuator to the specified dB level. Use caution, as sudden large changes to output power can damage the tube. **Response:** Resulting attenuation in XX.X dB. If the user specified an attenuation value outside the attenuator's range, the closest valid value will be used. **Note:** Use this to find max attenuation. For example, send {AK 99.9}. A typical response would be {AK 30.0}, indicating a 30 dB attenuation range. **Compatibility**: Attenuator required.

Min RF Power Trip
Command Byte: 'L' **Function**: Sets a Min RF trip point. If output power drops below the set point, an alarm or fault is generated provided the HPA has processed an "Enable RF Limits" command ('R'). **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, "D" to disable. XXXX is the desired trip point in Watts.

Max RF Power Trip
Command Byte: 'M' **Function**: Sets a Max RF trip point. If output power exceeds the set point, an alarm or fault is generated provided the HPA has processed an “Enable RF Limits” command ('R'). **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, “D” to disable. XXXX is the desired trip point in Watts.

High Voltage Level
Command Byte: 'N' **Function**: Allows the user to drop the high voltage by 1kV to improve tube performance on certain units. **Parameters**: '1' - Reduces the high voltage level (sets Ku band mode). '0' - Restores the high voltage level to it's default state. **Compatibility**: Triband HPAs only.

Reflected RF Trip
Command Byte: 'O' **Function**: Sets a Reflected RF trip point. If reflected power exceeds the set point, an alarm or fault is generated, as specified by the user. (Note: A hardware Reflected RF Trip Point is pre-set at the factory. You cannot adjust the hardware trip point by changing the software trip point). By default, the trip point is not enabled until the “Enable RF Limits” command ('R') is processed. **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, “D” to disable. XXXX is the desired trip point in Watts.

Miscellaneous Setup
Command Byte: 'P' **Function**: Miscellaneous Setup **Parameters:** “ZXXXX” to set linearizer amplitude, “zXXXX” to set linearizer phase. XXXX is a count between 0 and 4095. Note: You can convert counts to volts using the conversion equation V=counts*10/4096. **Compatibility:** Linearizer required **Parameters:** “CX” ti set Configuration Mode. X is the redundancy mode you wish to operate. 0 — is single thread no waveguide switch. 1 — is redundant system with one waveguide switch (1:1 configuration). 2 — is power combined system with two waveguide switches (1+1 configuration). 3 — is redundant system with a load switch on the output (1:1 w/load). 4 — Reserved.

Enable RF Limits
Command Byte: 'R' **Function**: Enables RF Limit Checking Note: This command is obsolete as of firmware version 3.73. (Use commands 'L': Low RF Trip, 'M': High RF Trip, and ‘O’: Reflected Power).

Disable RF Limits
Command Byte: 'S' **Function**: Disables RF Limit Checking Note: This command is obsolete as of firmware version 3.73. (Use commands 'L': Low RF Trip, 'M': High RF Trip, and ‘O’: Reflected Power).

Set Frequency
Command Byte: 'T' **Function**: Tells unit what frequency it is running at. **Response:** “TXX.XX” XX.XX is the frequency in GHz **Notes**: Affects reported power in outdoor controllers (XTC-100D) only.

Waveguide Switch Control
Command Byte: 'U' **Format:** 'U1' Activate override mode and switch in amplifier 'U0' Activate override mode and switch in other amplifier 'UM' Activate overide mode 'UA' Terminate overide mode, activating automatic mode NoteS: When sending a 'U1' or 'U0' command, also send a 'UM' command to the other amplifier to prevent unwanted automatic-mode switches. **Compatibility:** For Redundant ODUs only

Time and Date
Command Byte: '%' **Function:** Sets the Amplifier internal clock. The clock is referenced when time stamping faults as they are written to the Fault Log. **Parameter:** "YYYY/MM/DD, hh:mm" **Example:** 2002/02/08, 13:01 YYYY = 2002 MM = 02 DD = 08 hh = 13 mm = 01 Notes: (1) The hours are in 24 hour format. (2) This command is not available in all amplifiers. If your amplifier does not support this command, you will receive a rejected code "a" upon sending this command.

Simulate Front Panel Input
Command Byte: 'V' **Function**: Simulates Digital Rack HPA front panel keypad/encoder input. Any/all front panel input can be simulated using this command. Combining this command with query '5', *Current Screen*, grants remote access to all digital HPA menus and functions. Since digital HPAs maintain a menu system internally *even if they have no front panel interface*, these two messages provide an excellent method for setting up digital outdoor amplifiers. **Standard Parameters** (for all digital amplifiers): A variable length sequence of characters, each simulating a single front-panel action. '0', '1', '2', '3', '4', '5', '6', '7', '8', '9': Numeric input. 'A' HV On. 'a' HV ON without enable 'B' HV Off. 'b' HV OFF without enable 'C' Clear. 'D' Setup. 'E' Enable. 'F' Enter. 'G' Status2. 'H' Status1. 'I' Reduce Output Power by 0.1 db. 'J' Increase Output Power by 0.1 db. 'K' Reduce Output Power by 1.0 db. 'L' Increase Output Power by 1.0 db. 'i' Turn encoder shaft one click to the left. 'j' Turn encoder shaft one click to the right. 'k' Turn encoder shaft ten clicks to the left. 'l' Turn encoder shaft ten clicks to the right. 'W' Soft key 1. 'X' Soft key 2. 'Y' Soft key 3. 'Z' Soft key 4.

Simulate Front Panel Input, Continued
Alternate Parameters (for Xicom's digital outdoor controller): 'L': Toggle Local/Remote. 'A': Toggle HPA/AC Power. 'H': Toggle HPA heater standby. '!': Toggle HPA High Voltage. 'F': Fault Reset. '8': Up Arrow. 'E': Enter. '2': Down Arrow. **Notes**: If communicating with an amplifier via Xicom's digital outdoor controller, reference the alternate parameter list. Otherwise, use the standard parameter list. Rack amplifiers normally require that the enable key be pressed to process certain front panel inputs. However, this is not a requirement for processing simulated front panel input. Parameters 'I', 'J', 'K', and 'L' initiate Goto Power sequences (see commands 'D' and 'E', Goto Power.) Goto Power sequences typically take several seconds for the power to reach the desired level. For faster response, use parameters 'i', 'j', 'k', and 'l', which simulate encoder shaft input. However, the HPA must be in the correct screen (i.e. Status1). The encoder shaft is also used to scroll the fault log screen and to adjust settings on the linearization screen.

Set Serial Configuration
Command Byte: 'X' **Function**: Configures serial communications on the specified port. Use this command carefully as it could cause you to lose communications with the amplifier. See the *Get Serial Configuration* query for a related command. To configure the serial port, use Parameter Format 1. To configure RS-485, use Parameter Format 2. **Parameter Format 1**: "CBBBBBBPDS" C Communications port to configure 1=COM1, 2=COM2. BBBBBB Desired baud rate: 057600, 038400, 019200, 009600, 004800, 002400, 001200 P Parity, 'N', 'O', or 'E'. D Data bits, '8' or '7'. S Stop bits, '1' or '2'. **Parameter Format 2:** “RABC” **Response**: "ABC" A ‘4’ or ‘2’ Wire B ‘T’ (Terminated) or ‘U’ (Unterminated) C RS 485 address **Notes**: 1) The parameters listed represent all options currently available. 2) The leading zero on the baud rate is there to facilitate selection of higher baud rates in future software revisions. 3) Amplifiers currently support just two data/stop configurations: 8/1 and 7/2. Thus byte "S" is a placeholder. **Compatibility:** Not available when talking to an amplifier via a Digital Outdoor Controllers.

Preventive Maintenance

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Original Release	08/2001	ALCjr
2		Format changes	08/2001	ALCjr
3		Format change—Table of Contents, List of Figures, List of Tables	09/2001	ALCjr
A	9183	Original Release	10/12/2001	ALCjr
B	12737	Added English and German Language Battery Disposal Instructions	04/28/2005	RB
C	15718	Add Spare Amplifier Test Operation	01/30/2008	JN

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Preventive Maintenance

Requirements

Refer to drawings in Appendix B when performing preventive maintenance.

Weekly

Using a soft damp cloth, clean the Front Panel.

Monthly

Perform the following:

- Check the integrity of the output waveguide flange mounting bolts. Tighten as necessary. See the chapter titled *Unpacking and Installation* for waveguide tightening information.
- Check the integrity of the RF Input cable connected to the rear panel.
- Check the Input and Output Air Ports. If the filter is dirty preform the Air Filter Removal procedure.
- Check the integrity of all cables and connectors.

Air Filter Removal Procedure

Use this procedure to remove, clean, and replace the air filter.

1. Remove and retain the four screws holding the filter guard to the rear panel.
2. Remove the air filter.
3. Using low pressure air, blow the dust from the air filter.
4. Reinstall the air filter.
5. Using the four screws retained in Step 1, reinstall the filter guard.

Maintenance Procedures

Spare Amplifiers

To insure the working integrity and future availability of spare amplifiers, Xicom Technology recommends that approximately six months after delivery amplifiers are operated for a period of 30 minutes to one hour.

Use this procedure to test operate the spare amplifiers.

1. Inspect the test data provided with the amplifier and record the maximum value of helix current shown on the Small Signal Gain versus Frequency plot. The dashed line represents the helix current.
2. Attach a suitable waveguide load to the amplifier RF output port.
3. Connect the appropriate line voltage to the amplifier power input connector and turn on the AC power.
4. When the filament-time-delay is complete, turn on the high voltage.
5. Within 30 seconds after applying high voltage observe and record the value of helix current shown on the front panel or remote display. Continue to observe the helix current, recording the value shown after 5, 15, and 30 minutes of operation.
6. Compare the reference helix current obtained from the amplifier test data with the observed values. The helix current immediately after high voltage turn-on should be not greater than 2 times the reference value. After 5 minutes of operation, the helix current should not exceed 1.5 times the reference value. After 15 minutes of operation the helix current should be stable and not exceed 1.3 times the reference value. After 30 minutes of operation the helix current should not differ from the 15-minute value by more than 0.2 mA.

The above values provide general guidance for determining the condition of a spare amplifier. A specific unit may exceed these limits and still be operating satisfactorily. In particular, Ka-band and Q-band amplifiers with inherently very low values of helix current may show greater values at turn-on and in the first few minutes of operation. If these limits are exceeded, or if any alarms or faults are encountered when the high voltage is applied, Xicom Technology Customer Service should be contacted for assistance. Contact information is located in the chapter titled *Overview*.

Caution

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the manufacturer's instructions. Failure to comply could result in equipment damage.

Battery Disposal Instructions

General Information

Replacement battery part number: 490-0008-001

Disposal of spent batteries should be performed by an authorized, professional disposal company which has the knowledge of the requirements of the Federal, the State and Local authorities regarding hazardous materials, transportation and waste disposal. It is recommended that you contact your local EPA office.

Europe

The European Community (EC) has issued two directives: 91/157/EEC and 93/86/EEC. These directives are implemented differently by each member country. Therefore, in each country the manufacturers, importers and users are responsible for the proper disposal or recycling of batteries.

In accordance with these directives, the TL-5242/W battery contains no dangerous substances. The reaction products are inorganic and do not represent environmental hazards once the decomposition or neutralization process has terminated.

United States

Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (EPA) hazardous waste regulations as conveyed by the resources Conservation and Recovery Act (RCRA). The only metal of possible concern in the cell is the lithium metal that is not listed or characterized as a toxic hazardous waste. A significant amount of spent cells, and batteries that are untreated and not fully discharged, are considered as reactive hazardous waste.

Hazardous waste of spent cells and batteries can be disposed of after they are first neutralized through an approved secondary

treatment prior to disposal (as required by U.S. Land Ban Restriction of the Hazardous and Solid Waste Amendments of 1984).

Wartungsverfahren

Vorsicht

Es besteht Explosionsgefahr wenn die Batterie durch einen unvorschriftsmäßigen Typ ersetzt wird. Entsorgen Sie verbrauchte Batterien gemäß Herstellerangaben. Nichtbeachten könnte Sachschaden verursachen.

Anleitungen zur Batterieentsorgung

Allgemeine Informationen

Ersatz der Batterie mit der Teilenummer: 490-0008-001

Das Entsorgen verbrauchter Batterien sollte durch eine autorisierte, erfahrene Entsorgungsfirma erfolgen, welche mit den Vorschriften von Bund, Ländern und Gemeinden betreffend gefährliche Materialien, Beförderung und Müllentsorgung vertraut ist. Wir empfehlen Ihnen, sich mit Ihrem örtlichen Büro der Bundesbehörde für Umweltschutz in Verbindung zu setzen.

Europa

Die Europäische Gemeinschaft (EG) hat zwei Direktiven erlassen: 91/157/EEC und 93/86/EEC. Diese Direktiven werden von den einzelnen Mitgliedsländern unterschiedlich umgesetzt. Daher sind in jedem Land die Hersteller, Importeure und Benutzer für die vorschriftsmäßige Entsorgung oder die Wiederaufbereitung von Batterien verantwortlich.

In Übereinstimmung mit diesen Direktiven enthält die TL-5242/W Batterie keine gefährlichen Substanzen. Die Reaktionsprodukte sind anorganisch und bilden keine Gefahr für die Umwelt, nachdem der Prozess des Zerfalls oder der Neutralisation beendet ist.

Vereinigte Staaten

Lithium-Batterien sind in den Regulativen über Sondermüll der Federal Environmental Protection Agency (EPA) (Bundesbehörde für Umweltschutz), wie sie aus dem Resources Conservation and

Recovery Act (Gesetz über Bewahrung und Wiedergewinnung von Ressourcen (RCRA) hergeleitet werden, weder spezifisch gelistet noch ausgenommen. Das einzige möglicherweise bedenkliche Metall in der Zelle ist das Lithium-Metall, das nicht als giftiger Sondermüll gelistet oder charakterisiert ist. Eine größere Menge verbrauchter Zellen, und Batterien, die unbehandelt und nicht völlig entladen sind, werden als reaktiver Sondermüll betrachtet.

Sondermüll aus verbrauchten Zellen und Batterien kann entsorgt werden, wenn diese zuvor durch eine genehmigte sekundäre Behandlung vor der Entsorgung neutralisiert wurden (wie in den U.S. gesetzlich gefordert gemäß Land Ban Restriction der Hazardous and Solid Waste Amendments von 1984).

Service and Repair

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Incorporate RMA Form and format change	08/2001	A.L. Crozier, Jr.
3		Format changes—Table of Contents, List of Figures, List of Tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/12/2001	A.L. Crozier, Jr.
B	9359	Delete figure 1 and attach RMA Form PDF at end of chapter.	11/27/2001	A.L. Crozier, Jr.
C	9395	Remove RMA Form and replace with Figure 1.	01/07/2002	A.L. Crozier, Jr.
D	9997	Update to include controllers.	07/08/2002	A.L. Crozier, Jr.
E	11096	Update to reflect maintenance information	05/21/2003	A.L. Crozier, Jr.
F	11152	Update Figure 1 to reflect current form	03/08/2004	A.L. Crozier, Jr.

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Service and Repair

Introduction

Xicom Technology recommends that all equipment be returned to the Xicom factory or approved service centers for any calibration, tuning and repairs that require internal access to the equipment.

Special training, procedures, test equipment, and maintenance manuals are required to service this equipment. Do not attempt to service or repair Xicom Technology equipment unless you are a qualified technician and you have successfully completed the Xicom Technology equipment operation and repair program. Product maintenance manuals are provided to all personnel who complete the equipment operation and repair training program. The maintenance manuals include all the necessary documents to service and repair Xicom Technology equipment.

Return Authorization

Returned Material Authorization

Before returning the equipment obtain a RMA (Returned Material Authorization) Number. To obtain a RMA Number contact Xicom Technology at:

Telephone: **408-213-3000**
Facsimile: **408-213-3107**
email: **CustSupport@xicomtech.com**

Or you may use the online RMA request form located on the Xicom Technology Web Site:

www.xicomtech.com/support/support.htm

Figure 1 on page 5 is an example of the RMA Form.

When corresponding with Xicom Technology always refer to the equipment by the model number, part number and serial number.

Shipping Information

Return the equipment in the original packing. If the original packing is not available use wooden boxes or double layer corrugated boxes. Ensure there is adequate packing material between the equipment and the outside box. Seal the container with heavy packing tape or metal bands. Mark the container with the words *FRAGILE, DELICATE INSTRUMENT. HANDLE WITH CARE* on each side of the container.

Ship the container to the following address:

XICOM TECHNOLOGY
3550 Bassett Street
Santa Clara, CA 95054
RMA #_____

RMA REQUEST FORM

DATE: _____ WARRANTY: _____
RMA: _____ ORIG SHIP DATE: _____
COMPLETED BY: _____ ORIG SO : _____
WARRANTY EXPIRES: _____

CUSTOMER: _____

MODEL: _____ P/N: _____ S/N: _____
MODEL: _____ P/N: _____ S/N: _____

INCLUDED ACCESSORIES _____

Note: Please only return accessories as required to support repair testing

REASON FOR RETURN: _____

Has this unit been returned for repair before? Yes: ☐ No: ☐
USA: _____ UK: _____ Brazil: _____

SHIP TO ADDRESS: _____

BILL TO ADDRESS: _____

PREFERRED SHIPPING METHOD
Fed X ☐ _____ UPS ☐ _____
DHL ☐ _____ Other ☐ _____

PLEASE NOTE - Units returned during the Warranty period that are found to be problem free will be charged the minimum evaluation fee.
FOR ALL OUT OF WARRANTY UNITS: Xicom Technology will not proceed with the repair until we have a purchase order in place.

Price for this repair: _____ Includes all repair parts, labor, upgrades and full testing
Purchase order number: _____

***TWT and Linearizer Excluded - they will be quoted on a parts and labor basis.**
***The above price will not cover units that have been damaged beyond normal wear and tear- they will be quoted on a parts and labor basis - if repairable. Repair or Replacement at Xicom's Option.**
***Discontinued models will be quoted on a parts and labor basis - if repairable. Repair or Replacement at Xicom's Option.**
***Minimum Evaluation price will be charged for minor repairs, $1000. for amplifiers, $350. for controllers.**

Contact
Name: _____
Phone: _____
Fax: _____
e-mail: _____

Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054
Tel: 408-213-3000, Fax: 408-213-3107

Enclose a copy of this form with unit and ship to:
Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054
Attn: RMA

Revision Date 3/8/2004

Figure 1, RMA Request Form Example

TWTA SPECIFICATION

XTRD-400K, 400W, SNG

This document is best viewed using the Times New Roman font

ECN	REV	DESCRIPTION	DATE	APPROVED
13857	C	Change para 3.2.4	04/10/2006	BS
12706	B	Change paras 3.2.3 and 4.2.4	02/09/2005	BS
11455	A	Rev change only	09/16/2003	JN
N/A	1	Document release.	07/21/2003	DC

1.0 **SCOPE.** This specification is for a traveling wave tube amplifier (TWTA) to be used in a satellite ground station. The TWTA is designed to operate indoors.

2.0 **APPLICABLE DOCUMENTS**

3.0 **SPECIFICATION.** The TWTA shall be designed to the requirements of this specification per the performance specifications of section 3.0 and tested to the ATP requirements of section 5.1 of this document

3.1 **ELECTRICAL**

3.1.1	Frequency	13.75– 14.5	GHz
3.1.2	Power		
3.1.2.1	RF Output Power (P_{Rated}) Reference: TWT power of	350 W 400 W	(55.4 dBm) min (56.0 dBm) min
3.1.2.2	Reflected Power Protection	P_{rated} –7 ± 0.5	dB
3.1.3	Gain, Large Signal	70	dB min
3.1.4	Gain, Small Signal	75	dB min
3.1.5	Gain variation, SSG		
3.1.5.1	Over any 750 MHz band	2.5	dB/750 MHz max
3.1.5.2	Over any 80 MHz band	1.0	dB/80 MHz
3.1.5.3	Gain slope	± 0.04	dB/MHz
3.1.5.4	Gain stability over temperature	± 1.0	dB@any frequency
3.1.5.5	Gain stability over Time	± 0.25	dB/24 hrs
3.1.6	Gain Control	25	dB min
3.1.7	Intermodulation with 2 equal carriers at TOPBO = -4 dB	-18	dBc max
3.1.8	Harmonic Output	-60	dBc max
3.1.9	AM to PM conversion	2.5	deg/dB at 6 dB below rated power max

3.1.10	Noise Power		
3.1.10.1	Transmit Band (13.75-14. 5 GHz)	-70	dBw/4KHz max
3.1.10.2	Receive Band (10.95-12.75 GHz)	-150	dBw/4KHz max
3.1.11	Group Delay, any 80 MHz		
3.1.11.1	Linear	0.01	nS/MHz max
3.1.11.2	Parabolic	0.005	nS/MHz squared max
3.1.11.3	Ripple	0.5	nS/Pk-Pk max
3.1.12	Residual AM Noise	-50 -20(1.5+Log(Freq)) -85	dBc up to 10 KHz max dBc fm 10 to 500 KHz max dBc above 500 KHz max
3.1.13	Phase Noise profile	10	dB below IESS phase noise
3.1.14	Spurious Signals		
3.1.14.1	Spurious Signals, spectral limits	-37 -20(1.5 + log(f))+13 -72	dBc up to 10 KHz max 10 to 500 KHz max above 500 KHz max
3.1.14.2	Line Related, individual	-50	dBc
3.1.14.3	Power Line Related, sum of all	-47	dBc
3.1.15	VSWR		
3.1.15.1	Input	1.3:1	max
3.1.15.2	Output	1.3:1	max
3.1.16	Prime Power	100-260 1400 0.95 45 to 63 Single Phase	VAC VA max Power factor min Hertz
3.1.17	Serial Interface		
3.1.17.1	RS-232	COM1	
3.1.17.2	RS-422/485 (4-Wire Mode or 2-Wire Mode)	COM2	

3.1.18 Controls

This specification describes the control functions of the HPA. Many control functions can be applied locally from the front panel of the HPA as well as remotely via the serial interface. Some of the control functions can only be applied via the local controls on the HPA. The following paragraphs specify these control functions and the LOCAL/REMOTE capability. Details of the communication protocol for serial control and the menu system for the local control are detail in the operation and installation manual for this HPA product. Please refer to that document for detailed information.

3.1.18.1 Controls, Local

	Function	Interface
3.1.18.1.1	AC Prime Power	Circuit Breaker
3.1.18.1.2	Local/Remote	Via Setup menu
3.1.18.1.3	COM 2 configuration	DIP switches
3.1.18.1.4	RF inhibit	Auxiliary interface connector (*)
3.1.18.1.5	Interlock	Auxiliary interface connector

(*) The RF O/P power will inhibit (turn off) when Pin 12 on the auxiliary interface connector is grounded (standard RF inhibit)

3.1.18.2 Controls, Local & Remote

3.1.18.2.1 HV (ON/OFF)
3.1.18.2.2 Heater Standby (ON/OFF)
3.1.18.2.3 Gain
3.1.18.2.4 Minimum Power Alarm
3.1.18.2.5 Maximum Power Alarm
3.1.18.2.6 Power Measurement Units (Watts, dBm, dBw)
3.1.18.2.7 Audio Alarm (ON/OFF)
3.1.18.2.8 Fault Reset
3.1.18.2.9 Lamp Test
3.1.18.2.10 COM 1 configuration (baud rate, parity, start/stop bits)
3.1.18.2.11 COM 2 configuration (baud rate, parity, start/stop bits)
3.1.18.2.12 HPA Address

Note: Heater Standby reduces the TWT's heater voltage for situations where the high voltage is off. Using this mode significantly increases the life of the TWT where high voltage is off for extended periods of time.

3.1.19	Monitoring		
3.1.19.1	Monitoring, local		
3.1.19.1.1	Front Panel LEDs		
3.1.19.1.1.1	Power	Color = Green	
3.1.19.1.1.2	FTD	Color = Amber	3 minutes min
3.1.19.1.1.3	Standby	Color = Amber	
3.1.19.1.1.4	HV On	Color = Green	
3.1.19.1.1.5	Htr Standby	Color = Amber	
3.1.19.1.1.6	Local	Color = Green	
3.1.19.1.1.7	Remote	Color = Green	
3.1.19.1.1.8	Summary Fault	Color = Red	
3.1.19.2	Operator Interface	4-line display, front panel	
3.1.19.3	Summary Fault	QTY 2, Auxiliary connector	
3.1.19.4	Monitors, local and remote		

	Function
3.1.19.4.1	Power Out
3.1.19.4.2	Reflected Power
3.1.19.4.3	TWT Temperature
3.1.19.4.4	Helix Current
3.1.19.4.5	Helix Voltage
3.1.19.4.6	Heater Hours
3.1.19.4.7	Beam Hours
3.1.19.4.8	High VSWR Fault
3.1.19.4.9	High Voltage Fault
3.1.19.4.10	Helix Current Fault
3.1.19.4.11	TWT Temperature Fault
3.1.19.4.12	Summary Fault

3.2 MECHANICAL

The following paragraphs specify important mechanical details pertaining to this product. The specific locations can be identified on the outline drawing specified in paragraph 3.2.1.

3.2.1	Outline	Per Xicom drawing 304-0024-001
3.2.2	Connectors	
3.2.2.1	AC Power	IEC 320/C20, rear panel
3.2.2.2	RF Input	Type N-female, rear panel
3.2.2.3	RF Output	WR-75, rear panel
3.2.2.4	RF Sample	Type N-female, front panel
3.2.2.5	Auxiliary	DA-15 (socket), rear panel
3.2.2.6	COM 1	DE-9 (pin), rear panel
3.2.2.7	COM 2	DE-9 (pin), rear panel
3.2.3	Cooling	Forced Air
3.2.3.1	Air Intake	diameter 4.0 inches, rear panel
3.2.3.2	Air exhaust	diameter 4.0 inches, rear panel
3.2.4	Weight	66 lbs (29.93 kg) max

4.0 ENVIRONMENTAL

4.1	Non-operating	
4.1.1	Temperature, non-operating	-50 to +70 C
4.1.2	Shock, Vibration	Normal transportation
4.2	Operating	
4.2.1	Temperature	-10 to +50 C
4.2.2	Humidity	Up to 95%, non-condensing
4.2.3	Altitude, operating	0 to 10,000 ft

4.2.4 Cooling Requirements

4.2.4.1 100 CFM (170 m^3/h^{-1}) minimum required air flow.

4.2.4.2 Combined inlet and exhaust pressure loss (back pressure) to be less than 0.1" H_2O (24.9 Pa) @ CFM (170 m^3/h^{-1}).* (Contact Xicom Technology customer service for technical assistance).

* NOTE: Pressure loss greater than 0.1" H_2O (24.9 Pa) @ CFM (170 m^3/h^{-1}) will decrease air flow (lower CFM) resulting in higher temperature operation and decreased life of the HPA.

5.0 TESTING REQUIREMENTS

5.1 Acceptance Test Procedure (ATP) requirements.

Frequency	3.1.1
Power	3.1.2
Transfer curve at mid-band	3.1.2
Gain, large signal	3.1.3
Gain, small signal	3.1.4
Gain flatness, small signal	3.1.5.1, 3.1.5.2, 3.1.5.3
Gain Control	3.1.6
Spurious signals	3.1.14
Prime Power	3.1.16
Sample Port Calibration	N/A

5.2 First Article Test Procedure (FAT) requirements.

FAT testing is done per the specified agreements between Xicom and it's customers. The FAT test shall include at a minimum the ATP. Please specify the FAT requirements at the time of order of the product.

Appendix A

ATP Test Performance Sheet

Serial Number _____

Test Conditions:
Unless otherwise specified, data will be taken at "Standard Conditions " aka **STD** defined as room (ambient) temperature, 100VAC, 60 Hz line voltage and attenuation = 0 dB.

TWT Serial Number _____
Cathode Voltage _____
Heater Voltage _____

Test Step 1: Test the HPA per the Final Test Setup Procedure WI-0500-00. Attach results to this TPS form.
Test Step 2: Test the HPA per the following:

Spec Paragraph No	Test Description	Test Condition	Requirements		Units	Measured Performance	Pass or Fail
			Min	Max			
3.1.2	Transfer Curve, aka AM/AM.	STD Freq =14.13 GHz Swept from P_{rated} – 20 dB to P_{rated}.	P_{rated} = 55.4	N/A	dBm	See attached plot	☐ Pass ☐ Fail
3.1.1 & 3.1.2.1	Rated Power	STD Freq = 13.75-14.5 GHz	P_{rated} = 55.4	N/A	dBm	See attached plot	☐ Pass ☐ Fail
3.1.2.2	Reverse Power Protection	STD Freq = 14.13 GHz	P_{rated} - 7.5 dB	P_{rated} - 6.5 dB	dB		☐ Pass ☐ Fail
3.1.1 & 3.1.3	Gain at Rated Power:	STD Freq =13.75-14.5 GHz	70	N/A	dB	See attached plot	☐ Pass ☐ Fail
3.1.1 & 3.1.4	Small Signal Gain	STD Freq =13.75-14.5 GHz	75	N/A	dB	See attached plot	☐ Pass ☐ Fail
		STD Freq =13.75-14.5 GHz Atten = 15 dB	-16*	-14*	dB	See attached plot	☐ Pass ☐ Fail
3.1.1 & 3.1.5.1	Gain Variation, small signal	STD Freq = 13.75-14.5 GHz Bandwidth = 750 MHz	N/A	2.5	dB/750 MHz		☐ Pass ☐ Fail
3.1.1 & 3.1.5.2	Gain Variation, small signal	STD Freq = 13.75-14.5 GHz Bandwidth = 80 MHz	N/A	1.0	dB/80 MHz		☐ Pass ☐ Fail
3.1.1 & 3.1.5.3	Gain slope	STD Freq = 13.75-14.5 GHz Bandwidth = 1Mz	N/A	± .04	dB/MHz		☐ Pass ☐ Fail
3.1.6	Gain Control	STD Freq. = 14.13GHz	25	N/A	dB		☐ Pass ☐ Fail

* referenced to measured small signal gain across the band

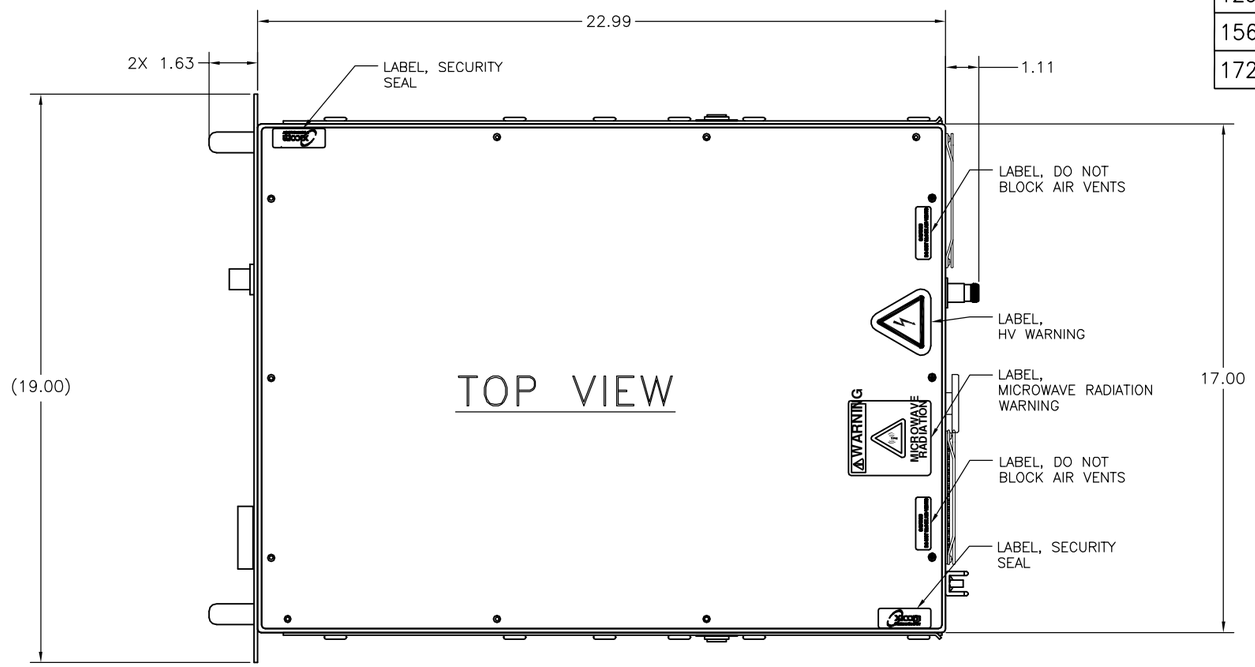
Appendix A

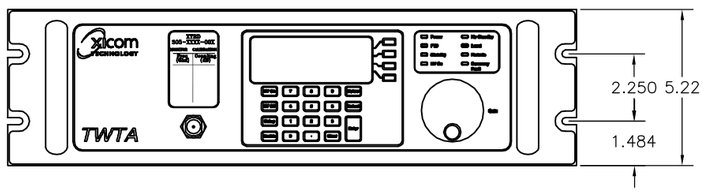
Spec Paragraph No	Test Description	Test Condition	Requirements		Units	Measured Performance	Pass or Fail
			Min	Max			
3.1.14.1 3.1.14.2 3.1.14.3	Spurious Signals Note 1. -37 dBc max 0- 10KHz (-20(1.5 + log(f))+13) dBc max 10-500 KHz -72 dBc max >500 KHz –50 dBc max line related individual -47 dBc max sum of all	STD Freq = 14.13 GHz P_{rated} – 3 dB, Line voltage = 100 VAC, 60 Hz					
		Span = 2 KHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
		Span = 20 KHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
		Span = 200 KHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
		Span = 2 MHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
		Span = 20 MHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
		Span = 200 MHz	N/A	Note 1	dBc	See attached plot	☐ Pass ☐ Fail
3.1.16	Prime Power Power Factor	260 VAC, 60 Hz	N/A	1400	VA		☐ Pass ☐ Fail
			0.95	N/A	-		☐ Pass ☐ Fail
		100 VAC, 60 Hz	N/A	1400	VA		☐ Pass ☐ Fail
			0.95	N/A	-		☐ Pass ☐ Fail
3.2.2.4	Sample Port Calibration	Set drive for 0 dBm at sample port. Record output power at flange	N/A	N/A	dB		
		Freq = 13.750 GHz	N/A	N/A	dB		
		Freq = 13.875 GHz	N/A	N/A	dB		
		Freq = 14.000 GHz	N/A	N/A	dB		
		Freq = 14.125 GHz	N/A	N/A	dB		
		Freq = 14.250 GHz	N/A	N/A	dB		
		Freq = 14.375 GHz	N/A	N/A	dB		
		Freq = 14.500 GHz	N/A	N/A	dB		

Tested by: _____ Date: _____ Data verified by: _____

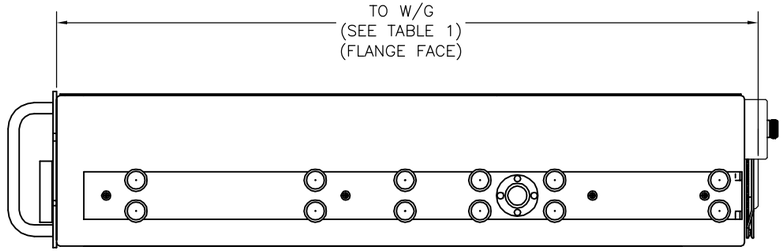
REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
11502	A	SEE ECO	11/25/03	DG/BS
12660	B	SEE ECO	11/30/04	RB/DG
12903	C	SEE ECO	4/15/5	RG/DG
15649	D	SEE ECO	7/27/07	HL/HB
17268	E	SEE ECO	02/10/11	RC/JT

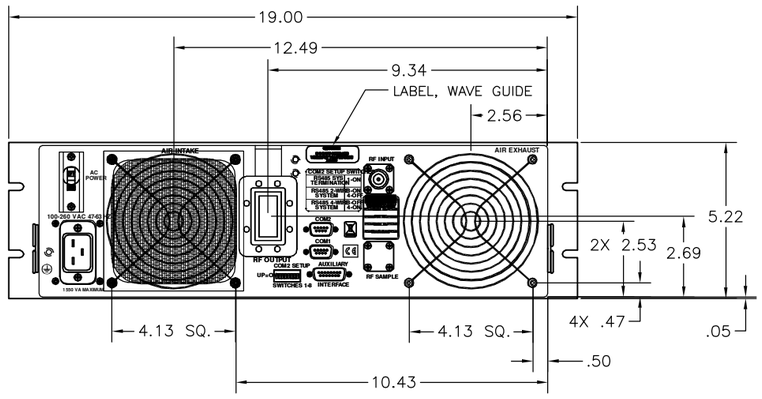




FRONT VIEW



SIDE VIEW



REAR VIEW

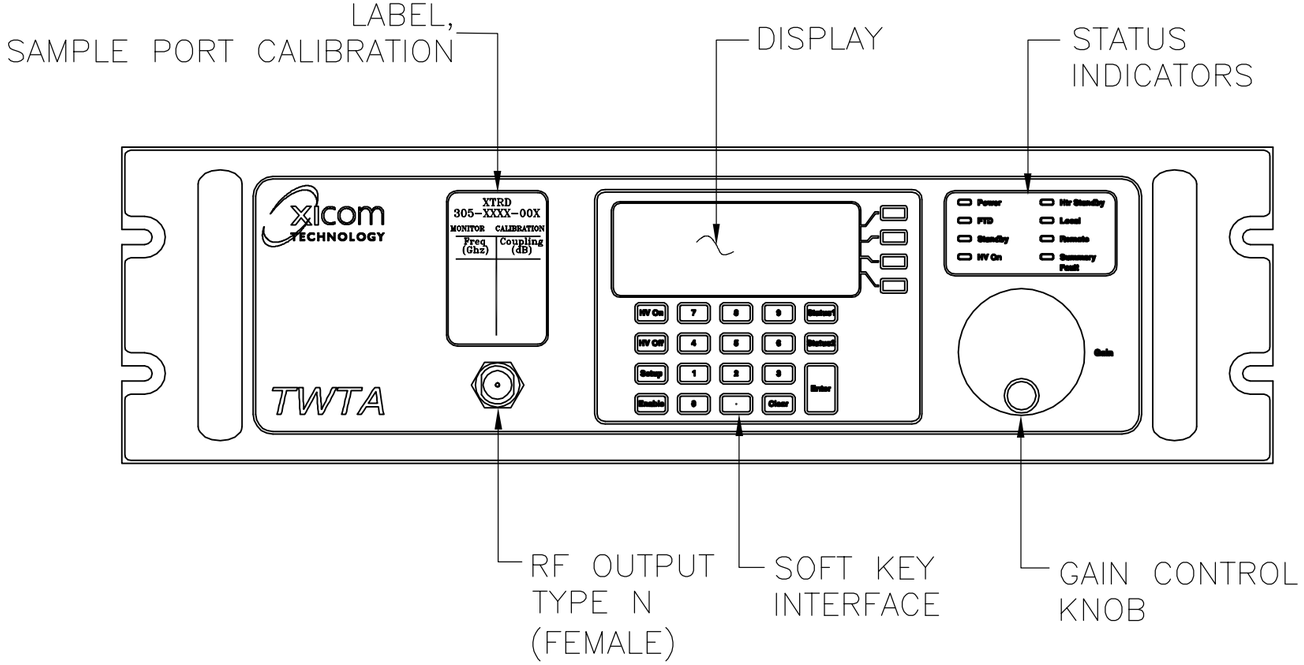
TABLE 1		
RF OUTPUT		DIM "A"
C-BAND	CPRG-137	23.45
KU-BAND	WR-75	23.43

ELECTRONIC APPROVAL SEE PLM (OMNIFY)

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES PER ANSI Y14.5M FRAC DECIMALS ANGLES SURF.✓ ± .XX ±.03 ±1° .XXX ±.015	CONTRACT NO.	XICOM TECHNOLOGY	
FINISH: N/A	DO NOT SCALE DRAWING	APPROVALS / DATE DRAWN D. GRANGER 2/11/04 CHECKED BOB BUSKEY 2/13/04 ENGRG DON CALDWELL 2/11/04 MANFG QA	OUTLINE, XTRD-400C/K	
			SIZE D · CAGE CODE · DWG. NO. 304-0271-001 · REV. E	
			CAD SCALE 1/1 · SHEET 1 OF 5	

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

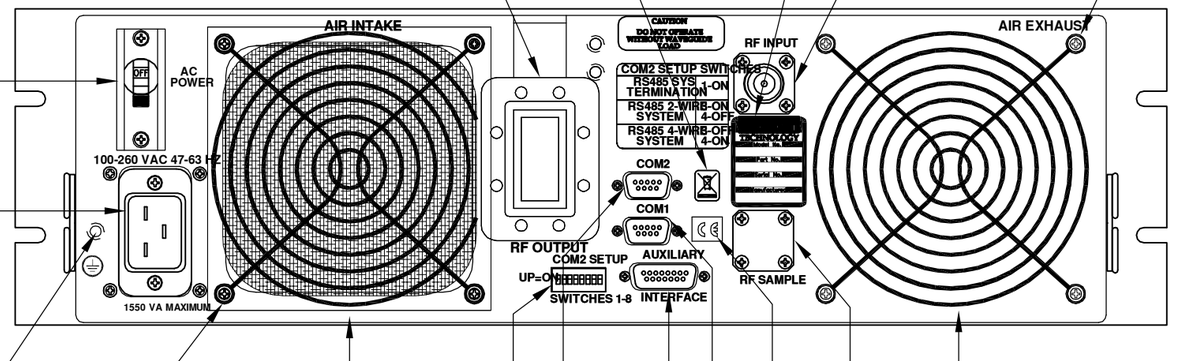
FRONT VIEW



XICOM TECHNOLOGY			
OUTLINE, XTRD–400C/K			
SIZE D	CAGE CODE	DWG. NO. 304–0271–001	REV. E
CAD SCALE 1/1		SHEET 2 OF 5	

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

REAR VIEW



AC POWER SWITCH

POWER, INPUT SOCKET
VDE, 16A, 250V
IEC 320/C20
P/N: EN60320

10–32 X .41 LG
GND STUD

AIR DUCT
MOUNTING HOLES 4X
6–32 X .31 MAX DEPTH

W/G FLANGE
(SEE TABLE 1)

LABEL,
WEEE

AIR INLET

COM2
CONFIGURATION SWITCH

COM 2
DE–9, (PIN)

AUX INTERFACE
DA–15, (SOCKET)

COM 1
DE–9, (PIN)

XICOM P\N
S/N IDENTIFICATION

RF INPUT
TYPE N
(FEMALE)

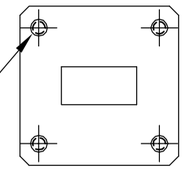
EXHAUST DUCT
MOUNTING HOLES 4X
6–32 X .31 MAX DEPTH

LABEL,
CE MARK

RF SAMPLE
TYPE N(FEMALE) (OPTIONAL)

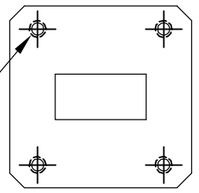
AIR EXHAUST

[1] 4X 6–32 UNC–2B
.37 MAX DEPTH



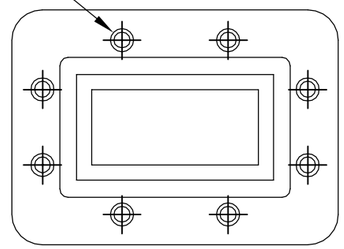
VIEW A
ROTATED 90°
2/1 SCALE

[1] 4X 6–32 UNC–2B
.37 MAX DEPTH



VIEW B
ROTATED 90°
2/1 SCALE

[1] 8X 10–32 UNFC–2B
.37 MAX DEPTH



VIEW C
ROTATED 90°
2/1 SCALE

NOTES: UNLESS OTHERWISE SPECIFIED

[1] MAX DEPTH REFERS TO HARDWARE DEPTH. ANY COMBINATION OF HARDWARE THAT EXCEEDS THIS DEPTH WILL RESULT IN DAMAGE TO COMPONENTS.

TABLE 1		
FREQUENCY	W/G FLANGE	VIEW
C–BAND	CPRG–137	C
KU–BAND	WR–75	B
DBS–BAND	WR–62	A

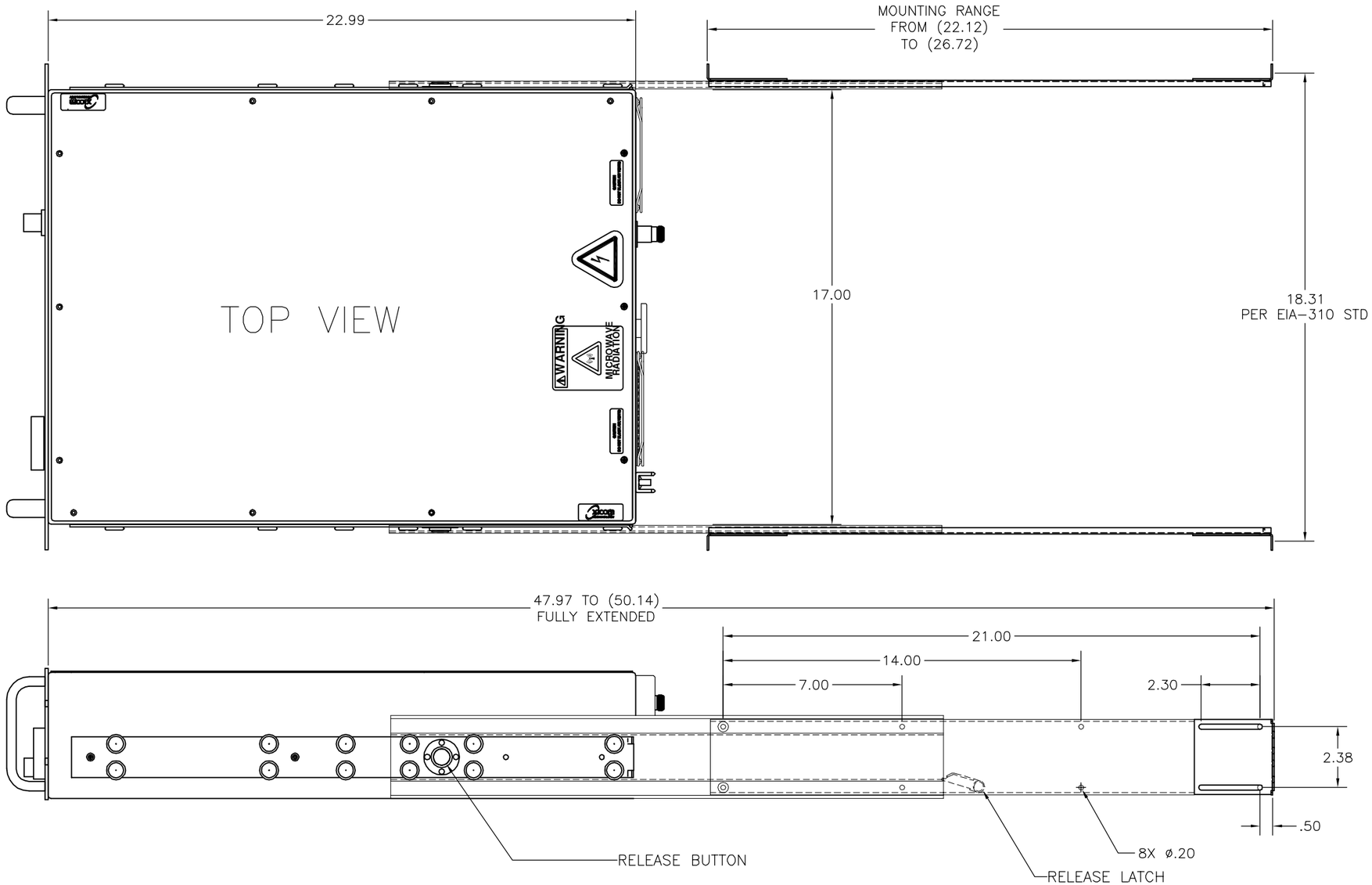
XICOM TECHNOLOGY

OUTLINE,
XTRD–400C/K

SIZE	CAGE CODE	DWG. NO.	REV.
D		304–0271–001	E
CAD SCALE 1/1		SHEET 3 OF 5	

REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–



XICOM TECHNOLOGY

OUTLINE,
XTRD–400C/K

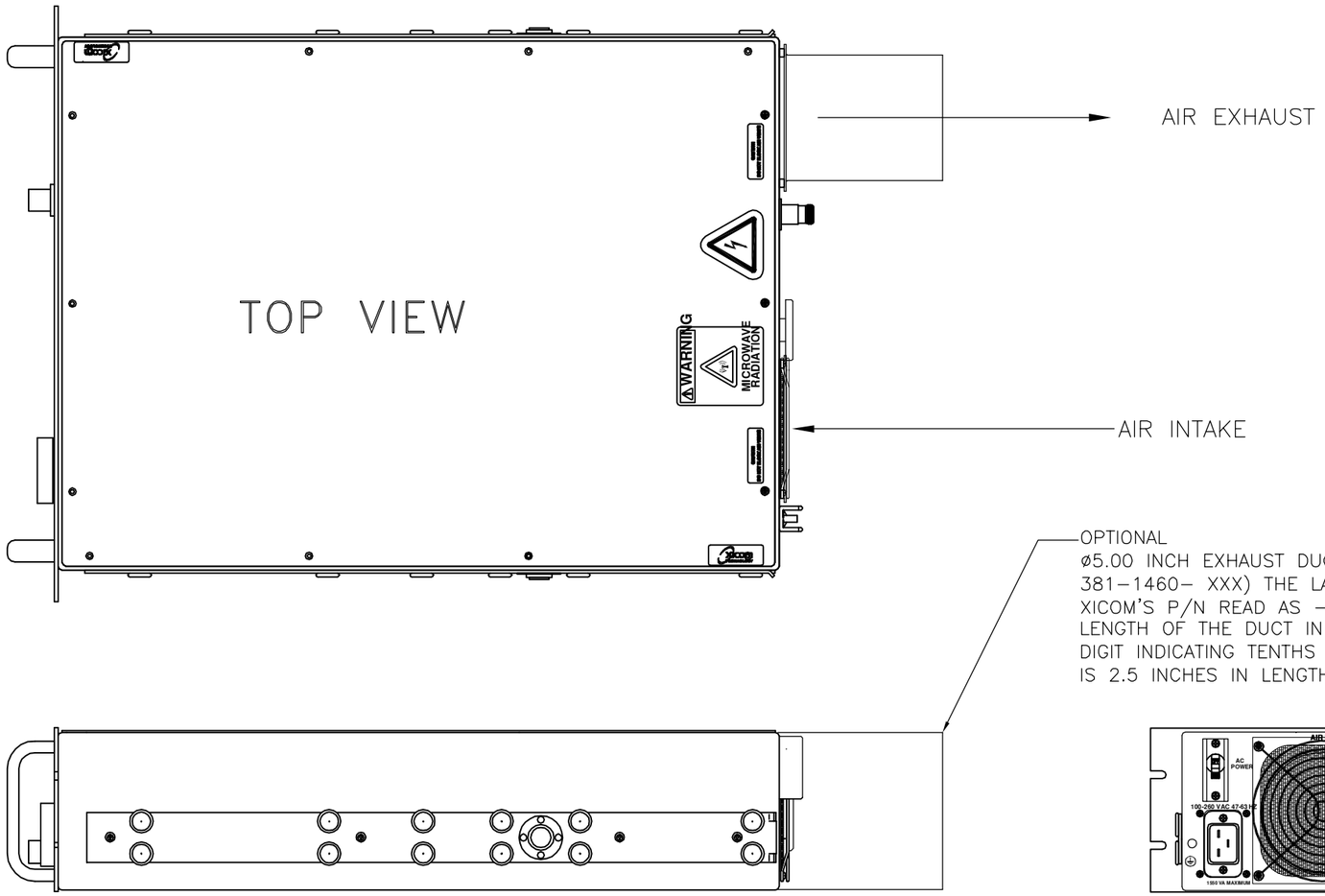
SIZE	CAGE CODE	DWG. NO.	REV.
E		304–0271–001	E

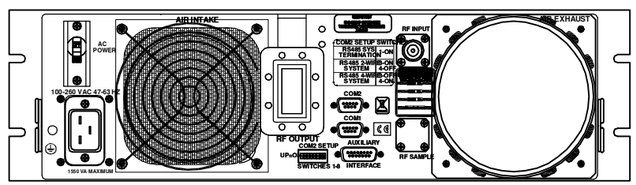
CAD SCALE 1/1 SHEET 4 OF 5

REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

APPLICATION VIEWS





AIR DUCT
APPLICATION VIEW

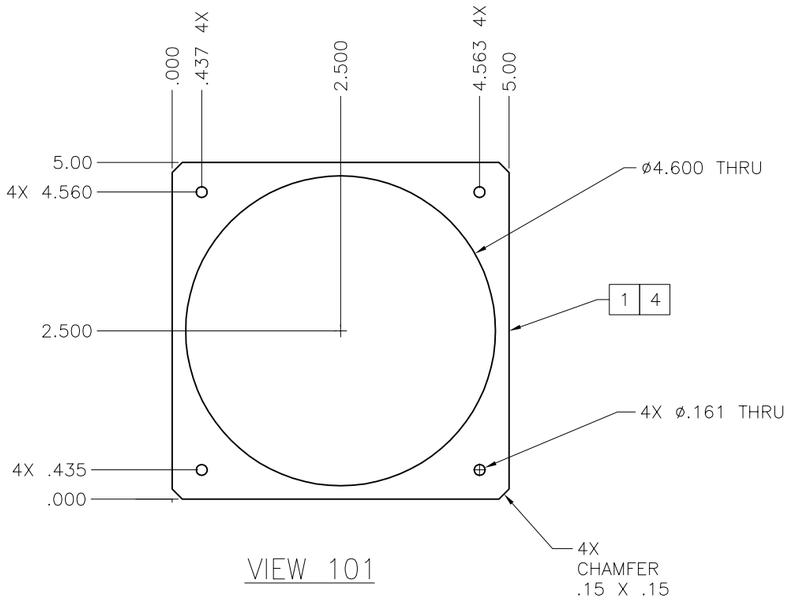
XICOM TECHNOLOGY

OUTLINE,
XTRD–400C/K

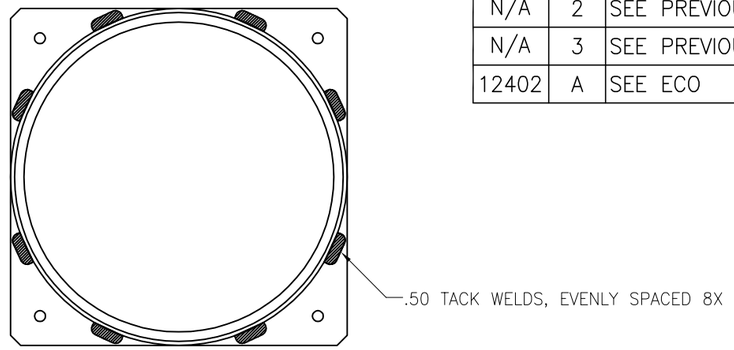
SIZE	CAGE CODE	DWG. NO.	REV.
E		304–0271–001	E

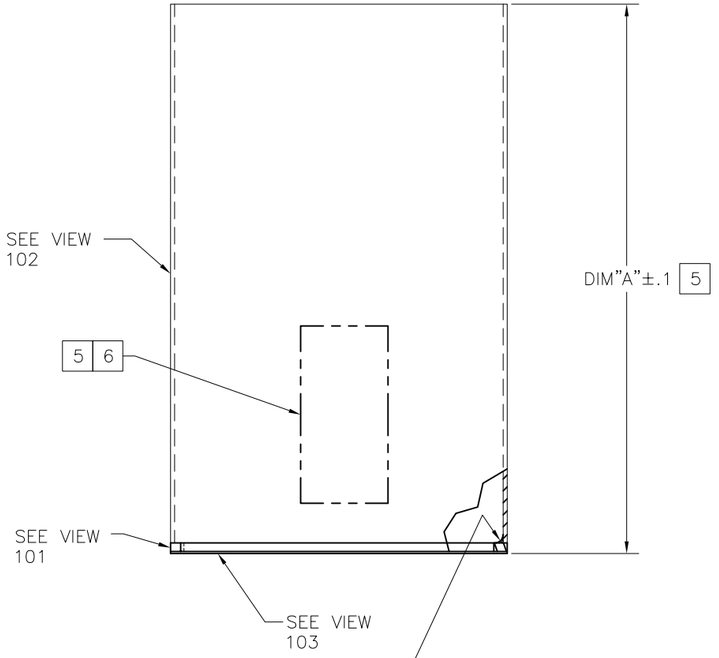
CAD SCALE 1/1 SHEET 5 OF 5

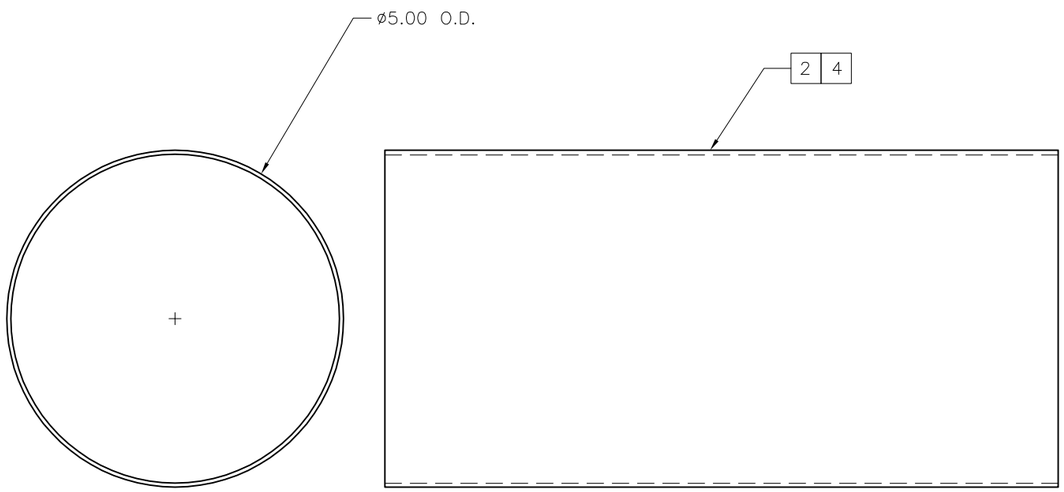
REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	1	INITIAL RELEASE	6/9/03	PM/BS
N/A	2	SEE PREVIOUS	6/17/03	DG/DC
N/A	3	SEE PREVIOUS	6/19/03	DG/DC
12402	A	SEE ECO	7/29/04	RB/DG



VIEW 101







VIEW 102

NOTES: UNLESS OTHERWISE SPECIFIED

1. MAT'L: ALUM., 5052–H32, .125 THK.
2. MAT'L: ALUM., 5052–H32, .060 THK.
3. MAT'L: .030 THK PORON, MFG P/N 4701–40–15030– 04–1PSA, ADHESIVE ONE SIDE. (REF XICOM P/N 675–0101–001).
4. FINISH: GRAIN FINISH AND CHEM FILM PER MIL–C–5541, CLASS 3, COLOR GOLD .
5. MAKE ASSY TO DIM "A" THE LAST THREE DIGITS OF THE XICOM P/N, READ AS XXX, INDICATES THE LENGTH OF THE DUCT IN INCHES WITH THE LAST DIGIT INDICATING TENTHS OF AN INCH. (e.g.: –025 IS 2.5 INCHES IN LENGTH.
6. MARK P/N 381–1460–(APPROPRIATE DASH NUMBER), REV (MARK REV PER LATEST REV IN REVISION BLOCK) AND VENDOR IDENT. USE INDELIBLE CONTRASTING COLOR .12 HIGH CHARACTERS LOCATED APPROXIMATELY WHERE SHOWN.
7. BREAK AND DEBURR ALL SHARP EDGES.

MATERIAL
1 2 3

FINISH
4

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES PER ANSI Y14.5M
FRAC DECIMALS ANGLES SURF.
± .XX ±.03 ±1°
.XXX ±.010

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN P. MULLIGAN	6/9/03
CHECKED	
ENGRG DON CALDWELL	6/17/03
MANFG	
QA	

XICOM TECHNOLOGY

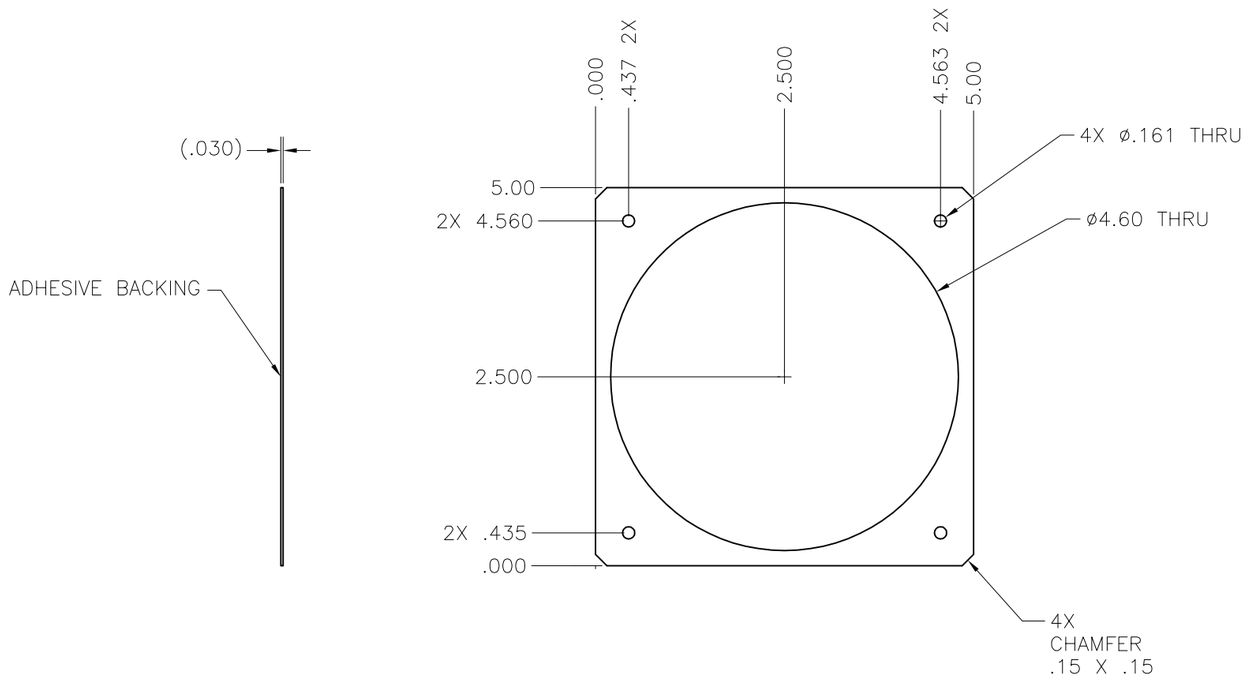
DUCT, EXHAUST,
5" DIA,
5 1/4" RACK

SIZE	CAGE CODE	DWG. NO.	REV.
D		381–1460–XXX	A

CAD SCALE 1/1 SHEET 1 OF 2

REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		



VIEW 103

3

XICOM TECHNOLOGY

DUCT, EXHAUST,
5" DIA,
5 1/4" RACK

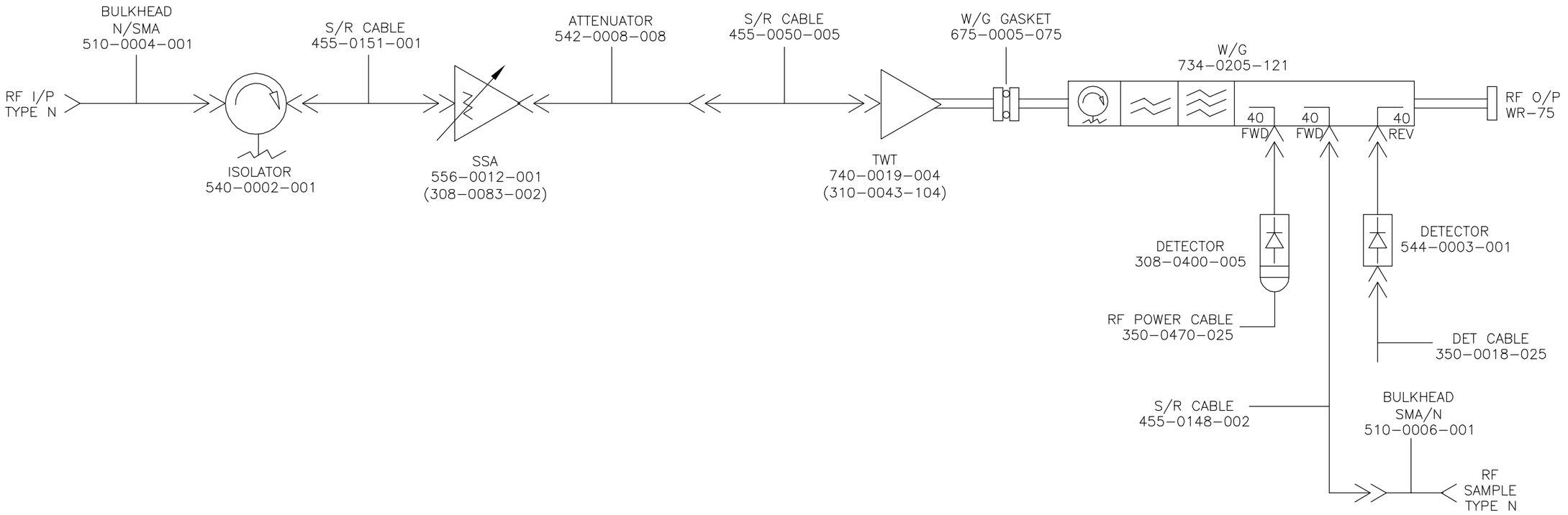
SIZE	CAGE CODE	DWG. NO.	REV.
D		381-1460-XXX	A

CAD SCALE 1/1 SHEET 2 OF 2

REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	1	INITIAL RELEASE	6/11/03	DG/DC
11455	A	SEE ECO	9/15/03	HL/BILL.S

RF INTERCONNECT
305-0062-301
XTRD-400K



MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES PER ANSI Y14.5M. FRAC ± / DECIMALS .XX ±.01 .XXX ±.005 / ANGLES ±1° / SURF. ✓	CONTRACT NO.	XICOM TECHNOLOGY	
FINISH: N/A	DO NOT SCALE DRAWING	APPROVALS / DATE: DRAWN D. GRANGER 6/11/03; CHECKED; ENGRG DON CALDWELL 6/11/03; MANFG; QA	INTERCONNECT, RF 305-0062-301	
			SIZE D; CAGE CODE; DWG. NO. 307-0252-301; REV. A	
			CAD SCALE NONE; SHEET 1 OF 1	

ASSY,MICRO CNTRL,SYS

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	1	INITIAL RELEASE	6/16/03	DG/DC
12689	A	SEE ECO	11/24/04	DG/DC
15272	B	SEE ECO	5/3/07	DJ/RVW

SSA ASSY. 308-0083-002 — J1 (1,1 / 6,6) — 350-0076-019 — J7 (1,1 / 6,6)

SSA MONITOR & CONTROL ASSY. 320-0274-001 [1]

- J15 (1,4) N/A — UP CONVERTOR
- J13 (1,6) N/A — W/G ARC PORT
- J12 (1,6) N/A — LINEARIZER PORT
- J2 (1,4) — J1 (1,4) — 350-0470-025 — J4 (1,4) — FORWARD POWER MONITOR — DETECTOR 308-0400-005 (SEE RF INTERCONNECT)
- J3 (1,2) — 350-0018-025 — REVERSE POWER MONITOR — DETECTOR 544-0003-001 (SEE RF INTERCONNECT)
- J5 (1,2) — 350-0099-001 — COVER INTLK — INTERLOCK SWITCH 460-0028-001 (NO, COM)
- J9 (1,2) — BUZZER 308-0079-004 — BUZZER
- J1 (1,26 / 1,26) — 350-0053-018 — HIGH VOLTAGE BOARD INTERFACE — TO 320-0323-XXX BOARD (SEE HV INTERCONNECT)
- J10 (1,2) N/A — AUX SSA POWER
- J8 (1,4) N/A — AUX FORWARD POWER MONITOR
- J2 (1,4 / 1,4) — 350-0083-020 — LOW LINE MONITOR — TO 320-0054-XXX PFC (SEE PWR INTERCONNECT)
- J11 (1,2 / 1,2) — TWT TEMP — 310-0004-014 — FROM 310-0043-XXX TUBE (SEE HV INTERCONNECT)
- J14 (1,?) N/A — +24V MONITOR
- J6 (1,16 / 1,16) — 350-0082-026 — SUMMARY FAULT PORT — J3 (1,16 / 1,16)

ISA BUS — ISA BUS — 320-0147-004 — ISA BUS — ISA BUS

SUB ASSY,OCTAGON 4000 SERIES CPU

- J4 (1,3 / 1,3) — BATTERY 490-0008-001
- J1 P3 (1,10 / 1,10) — IC,ATEML 512K FLASH, AT29C040A-15PI 490-0009-001
- J2 P2 (1,10 / 1,10) — OCTAGON 4000 SERIES CPU 490-0007-001 [1]

OPERATOR INTERFACE CCA 320-0272-001

- GAIN ADJ. (3)
- LED DISP. (8)
- VF DISP 490-0020-001 (14) — J1
- MEMBRANE SWITCH 390-0001-001 (14) — J2

FRONT BULKHEAD

RS232-RS485 CONVERTOR & I/O 320-0074-001 [1]

- J4 (1,15) — COM 2 — 350-0075-004 — P2 (1,10) / J2 (1,10)
- SW1 (1,15) N/A — COM 2 SETUP SWITCH 1-8 UP=ON
- J1 (1,10) — P1 (1,10)
- J6 (1,9) — COM 1 — 350-0073-001

REAR BULKHEAD

AUXILARY INTERFACE — J4 (1,15 / 1,15) — 350-0085-001

TABLE 1

320-0274-001

JUMPER	PINS	SETTING	FUNCTION
JMP1	1-2	OPEN	SETS 15V TO LINEARIZER WHEN SHORTED
	2-3	OPEN	SETS 24V TO LINEARIZER WHEN SHORTED
JMP2	1-2	OPEN	SETS 15V TO AUX SSA WHEN SHORTED
	2-3	OPEN	SETS 24V TO AUX SSA WHEN SHORTED
JMP3	1-2	SHORTED	RF INHIBIT "NORMAL" WHEN SHORTED
	2-3	OPEN	RF INHIBIT "REVERSE" WHEN SHORTED
JMP4	1-2	OPEN	HV INHIBITED DURING RF INHIBIT WHEN SHORTED
JMP5	1-2	SHORTED	SHORTED FOR SINGLE DRAWERS OPEN FOR DUAL DRAWER UNITS
JMP6	1-2	OPEN	UPLINK POWER CONTROL
	2-3	SHORTED	NORMAL

320-0074-001

JUMPER	PINS	SETTING	FUNCTION
JMP1	1-2	OPEN	TIES GND ON PS1 TO CHASSIS GND WHEN SHORTED
JMP2	1-2	OPEN	SETS 24V TO PS1 WHEN SHORTED
	2-3	SHORTED	SETS 5V TO PS1 WHEN SHORTED

OCTAGON 4000 SERIES 490-0007-001

JUMPER	PINS	SETTING	FUNCTION
W1	1-2	SHORTED	COM2 SOURCE (NOMINAL COM 2 RS-232)
	3-4	OPEN	
W2	1-2	OPEN	VIDEO BOOT
	3-4	SHORTED	BIOS BOOT
	5-6	SHORTED	DEFAULT
	7-8	SHORTED	NMI INTERRUPT SOURCE
	9-10	OPEN	
W3	1-3, 2-4	SHORTED	(FLASH MEMORY)
	5-8, 13-22	OPEN	
	9-10	SHORTED	(ENABLED)
	11-12	SHORTED	(IRQ5)
W4	1-2	OPEN	IRQ5 OPTO INTERRUPT ENABLE

NOTES: UNLESS OTHERWISE SPECIFIED

[1] CONFIGURE JUMPERS PER TABLE 1.

ELECTRONIC APPROVAL SEE PLM (OMNIFY)

MATERIAL N/A

FINISH N/A

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES PER ANSI Y14.5M
FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF. ✓
DO NOT SCALE DRAWING

CONTRACT NO.		
APPROVALS		DATE
DRAWN	D.GRANGER	6/12/03
CHECKED		
ENGRG	DON CALDWELL	5/16/03
MANFG		
QA		

XICOM TECHNOLOGY

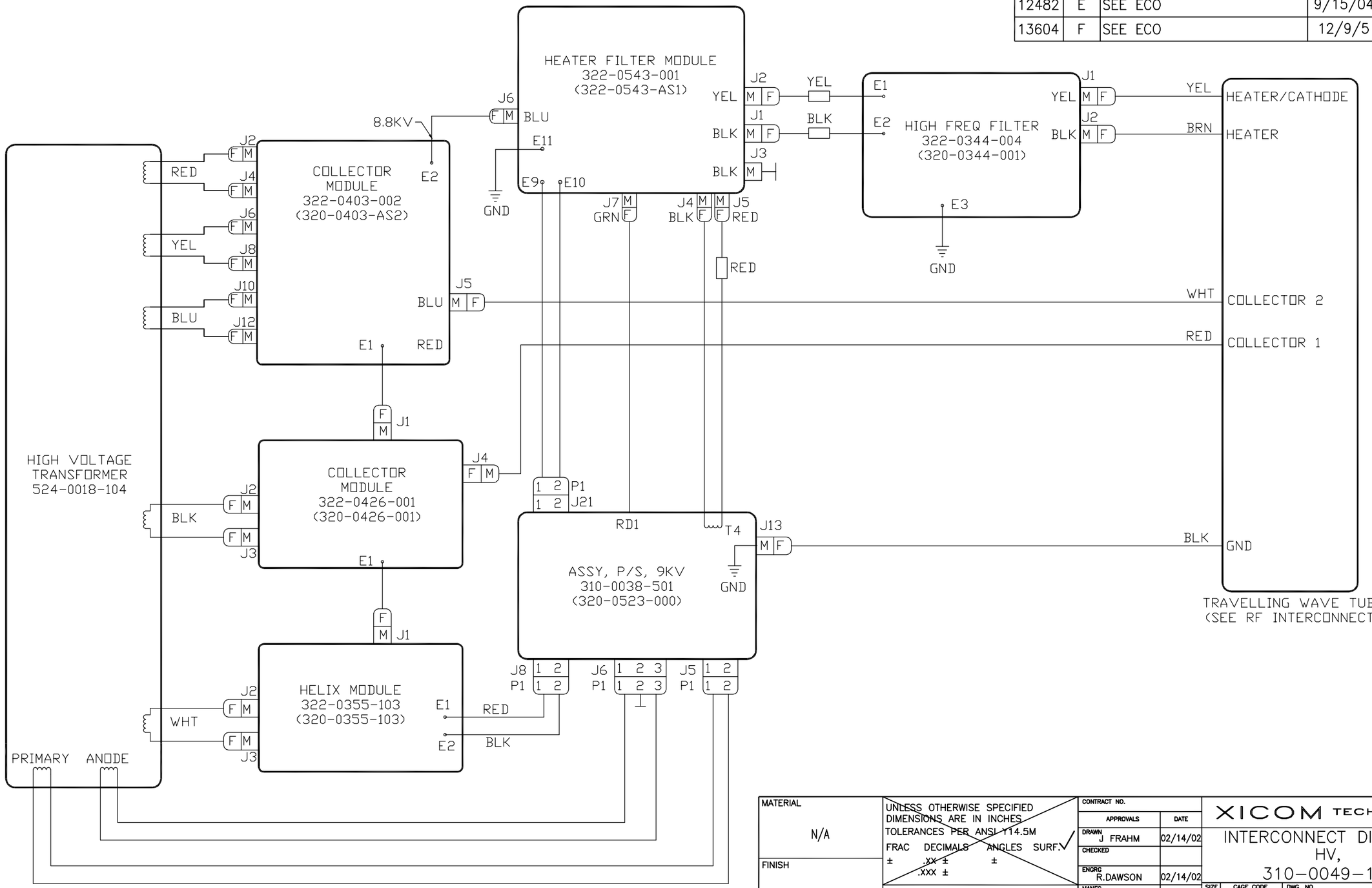
INTERCONNECT, LOGIC, XTRD-400K
305-0062-301

SIZE	CAGE CODE	DWG. NO.	REV.
D		307-0560-301	B

CAD SCALE NONE — SHEET 1 OF 1

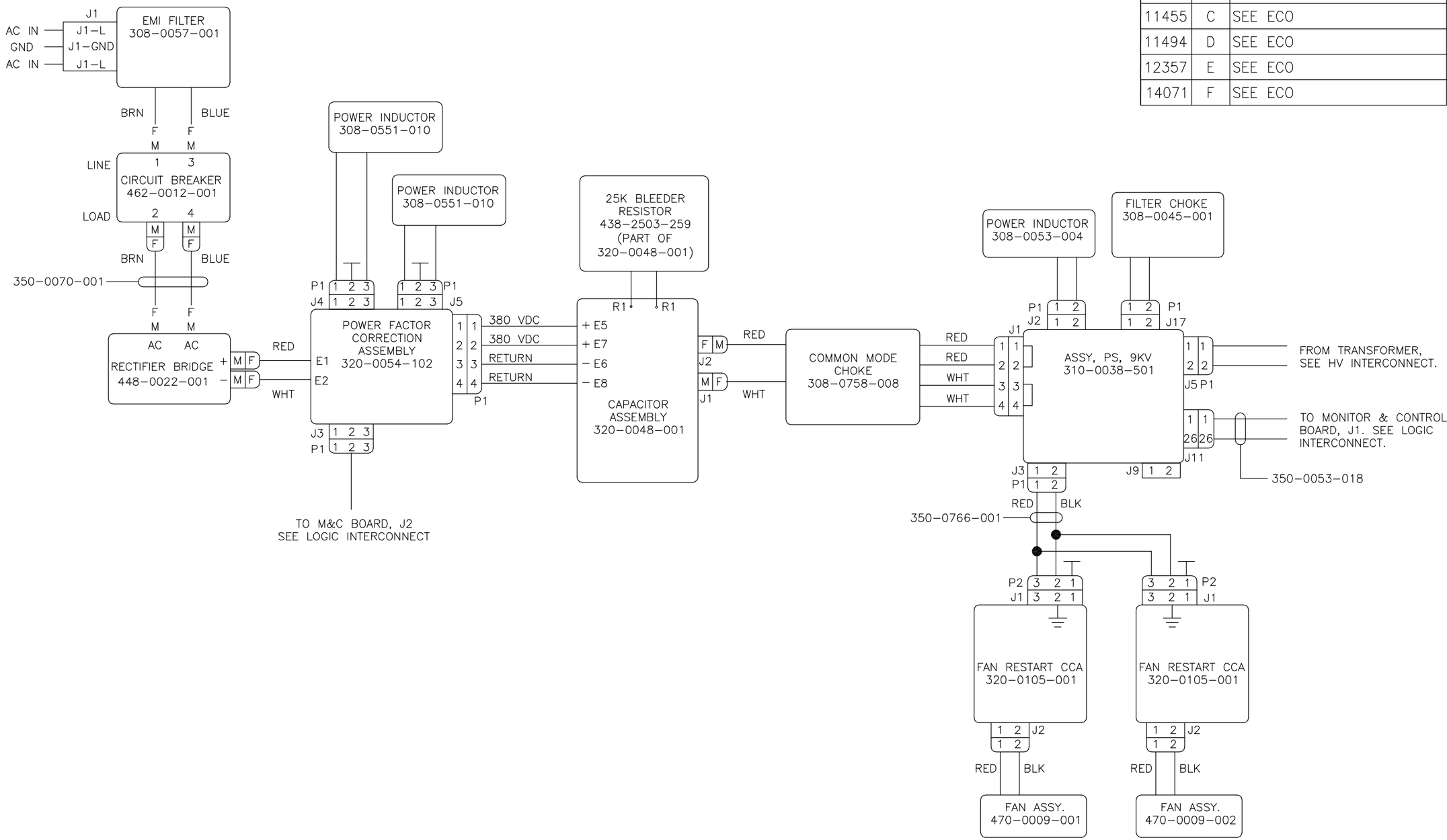
REVISIONS

ECO	REV.	DESCRIPTION	DATE	APPROVED
11494	C	SEE ECO	10/28/3	RG/QC
11972	D	SEE ECO	3/10/04	DG/QC
12482	E	SEE ECO	9/15/04	DG/QC
13604	F	SEE ECO	12/9/5	DG/JT



MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES PER ANSI Y14.5M. FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF. ✓	CONTRACT NO.	XICOM TECHNOLOGY	
FINISH: N/A	DO NOT SCALE DRAWING	APPROVALS / DATE: DRAWN J FRAHM 02/14/02; CHECKED; ENGRG R.DAWSON 02/14/02; MANFG; QA	INTERCONNECT DIAGRAM, HV, 310-0049-101	SIZE D; CAGE CODE; DWG. NO. 307-0586-101; REV. F; CAD SCALE NONE; SHEET 1 OF 1

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
9954	B	SEE ECO	7/29/02	MMxN/RB
11455	C	SEE ECO	9/15/03	HL/BILL.S
11494	D	SEE ECO	10/22/3	RG/QC
12357	E	SEE ECO	8/2/04	DG/QC
14071	F	SEE ECO	–	DG/QC



ELECTRONIC APPROVAL SEE PLM (OMNIFY)

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES PER ANSI Y14.5M. FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF. ✓	CONTRACT NO.	XICOM TECHNOLOGY
FINISH: N/A	DO NOT SCALE DRAWING	APPROVALS / DATE: DRAWN J FRAHM 02/14/02; CHECKED; ENGRG R. DAWSON 02/14/02; MANFG; QA	INTERCONNECT DIAGRAM, POWER, 310–0049–101
			SIZE D; CAGE CODE; DWG. NO. 307–0587–101; REV. F
			CAD SCALE NONE; SHEET 1 OF 1